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A series of investigations studied dimensions of individual differences in elementary and secondary school students in ability and "style" in speaking, writing, and other verbal performances; the relations of these dimensions to measured personality characteristics; early childhood and home background factors in these variables; and the relative effectiveness of three teaching methods to improve skills in written composition and performance on verbal ability tests including theme writing. Related studies included one of the dimensions of style in the works of established writers, a study of the tendency to give "opposite" responses in free association tests and its relation to verbal ability and personality, and a study of personality ratings based on experimentally controlled voice samples. Few if any significant relations were obtained between personality measures and measures of speech or writing performance, but several dimensions of ability and style in verbal tests and performances were established. Speaking abilities were shown to be factorially complex, dependent partly on the method of measurement or observation. Significant home background factors in language development were identified. Certain teaching methods ("Fluency," "Structural Grammar," and "Logical Thinking") produced significant improvements in measured verbal abilities. (Author)

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U. S. DEPARTMENT OF
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PERSONALITY FACTORS IN THE DEVELOPMENT OF COMMUNICATION AND LEADERSHIP SKILLS

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Cambridge, Massachusetts

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TABLE OF CONTENTS

Page

PREFACE AND ACKNOWLEDGMENTS 1

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS 3

INTRODUCTION 9

STUDY I. Factor Analysis of Speech Performance Variables as Measured in Sixth-Grade Children 15

STUDY II. Changes in Perceived Personality Traits as a Function of Manipulations of Vocal Characteristics 17

STUDY III. A Factor Analysis of Literary Style 20

STUDY IV. Opposite-Giving in Free Association Tests as a Personality Variable 24

STUDY V. Relationships between Oral and Written Spontaneous Compositions 26

STUDY VI. A Comparison of Three Approaches to the Training of Written Composition Behavior 27

STUDY VII. A Study of Home Background Variables Affecting Communicative Skills 34

STUDY VIII. Factor Analysis of Verbal Ability Variables in Relation to Written Communicative Skills 38

STUDY IX. Factor Analysis of Speech and Personality Variables Measured in Study VII 38

STUDY X. Relations between Personality and Written Composition Style 39

STUDY XI. Study of Judgments of Children's Personality from Voice Recordings 53

STUDY XII. (Untitled) 53

STUDY XIII. (Untitled) 54

STUDY XIV. Review of the Literature of Speech and Personality . . . 54

STUDY XV. Verbal Style of Conceptualization and Personality Characteristics 54

REFERENCES 58

PUBLICATIONS RESULTING FROM THIS PROJECT 60

APPENDICES 61

ERIC REPORT RÉSUMÉ . . . .

PREFACE AND ACKNOWLEDGMENTS

This Final Report is not a final report in the usual sense of the phrase; that is to say, it does not aim to present the full results of the work done under the contract. Rather, it is in the form of a memorandum concerning the status of this work at the time of submitting the report. There are two reasons for not presenting a full final report:

(1) A number of studies done under this contract have already been reported either in full or in part in regular channels of scientific communication, either as journal articles, doctoral dissertations, or chapters in books. It would be redundant to include reports of work already published. This report will, however, give citations of publications so that the reader can find fuller information on the studies that have already been reported. In the case of those studies that have been only partially reported in print, it will summarize findings that remain unpublished and indicate what portions of the studies, if any, remain to be completed.

(2) Despite the long time that has elapsed since the official termination of the contract (June 30, 1960), the principal investigator has not had opportunity or funds to complete a number of studies planned in the original project proposal. It had been hoped that some of this work could be completed, but it is now felt desirable to close out the books of the project. This final report will indicate the status of the unfinished substudies. Some of these require only the writing of reports, others require considerable analysis of data. It is still hoped that some of these studies can be completed even after submission of this final report.

The original hypothesis of this study was that personality factors play a large role in the development of communication skills. In the original project proposal, a number of studies were planned in order to explore this hypothesis. As so often happens in the conduct of investigations with large and complex aims, it proved to be difficult to get a handle on the problems being investigated. The work was conceived as a research program in which a number of basic methodological and substantive problems would have to be solved before the major hypotheses could be attacked. The attention of the investigators tended to be diverted into certain channels because of the problems raised by some of the initial methodological studies. Because the project supported the work of several doctoral candidates, the particular interests of these candidates tended to shift its energies in certain directions. There were unexpected difficulties in arranging to obtain appropriate experimental subjects or sufficient testing time, and in completing computations using high-speed computing facilities. (The project was conducted at a time when many computer programs were just being "debugged," and when rapid development of hardware made continuous revision of computer programming necessary.) Hindsight indicates that the contract period of three years was really too short to permit completion of the numerous studies originally planned, but for a number of reasons it was not possible to extend the official period of the contract nor to obtain additional funds to complete the studies.

Nevertheless, a number of large and significant studies were completed under this contract--more studies, indeed, than have usually been completed under other government contracts of comparable magnitude. Some of these studies represent substantial progress towards achieving the aims of the original project proposal. In the Summary, the significance of these studies is indicated in more detail.

As Principal Investigator, I wish to acknowledge the large amount of effort and devotion that were put into this project by a number of my collaborators. As research assistants, Michael Marge, Frederic D. Weinfeld, and Aaron S. Carton performed major studies which resulted in doctoral dissertations. They also helped on various other project tasks. The late Paul M. Kjeldergaard (deceased January 1968), who came into the project as Research Associate in its third year, made major contributions to the design of studies and helped to complete several important investigations. Dr. Robert Gardner, as a Research Associate in the third year of the study, helped in initiating and designing certain studies. The contributions of Marilyn Brachman, Research Assistant in the first year of the study, and of Joan Drues, Research Assistant in the third year of the study, should also be acknowledged.

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The results of this investigation can be classified under four headings: (1) identification of dimensions of ability and "style" in speaking, writing, and other kinds of verbal productions; (2) findings concerning the relation of these dimensions of ability and "style" to measured personality characteristics; (3) findings concerning the possible genesis of some of these ability and "style" factors in home background and early childhood experience; (4) findings concerning the relative effectiveness of certain methods of teaching skills in written composition.

1. Identification of dimensions of ability and "style" in speaking, writing, and other kinds of verbal production. The bulk of the studies in this investigation concerned this area; studies were conducted with different types of samples of individuals and of verbal productions.

a. In a study (Study VI in this series) of tests given to 9th-, 10th-, and 11th-graders, a number of the usually found factors of verbal ability were confirmed: Theme-Writing, Ideational Fluency, Verbal Relations, Word Fluency, Reasoning, and (probably) Fluency of Expression.

b. In a study (Study VII) of tests and ratings by teachers and speech specialists of the speech performances of 143 eleven-year-olds, a number of factors were identified:

I. General Speaking Ability as assessed by speech specialists from recordings of speech performance.

II. Motor Skill in Speaking.

III. Speech Dominance: tendency to dominate in verbal communication situations.

IV. Non-Distracting Speech Behavior: avoidance of speech characteristics (hesitations, rephrasings, etc.) that draw attention to how a communication is presented, rather than to its content.

V. Voice Quality: described by excellence of articulation, pronunciation and fluency as well as pleasantness.

VI. Language Maturity: described by complexity of grammatical usage, and other indicants of level of language development.

VII. General Speaking Ability as assessed by teachers on the basis of general classroom observation.

c. In a study (Study III) of characteristics of the "style" of 150 samples of literary production (authored in most cases by professional writers), six interpretable factors emerged from a factor analysis of 29 subjective ratings and 39 objective measures:

I. Evaluation: defined by subjective scales such as good-bad, pleasant-unpleasant, strong-weak, and interesting-boring.

II. Personal Affect: defined by subjective scales such as personal-impersonal, intimate-remote, emotional-rational, and vigorous-placid, but also by certain objective measures such as number of personal pronouns.

III. Ornamentation: defined by subjective scales florid-plain, wordy-succinct, lush-austere, etc., as well as objective variables such as length of sentences and length of clauses.

IV. Abstractness: defined by subjective scales such as subtle-obvious, abstract-concrete, and profound-superficial as well as objective measures such as a low proportion of numerical expressions, a low number of determining adjectives and pronouns, and a high proportion of noun clauses.

V. Seriousness: defined by subjective scales earnest-flippant and serious-humorous and by objective indicators such as a low proportion of indefinite articles, and a high proportion of indefinite and quantifying determining adjectives.

VI. Characterizing vs. Narrating: measured exclusively by objective indicators: a low proportion of transitive verbs, a high proportion of copulative verbs relative to all verbs, a low number of proper nouns, a high proportion of adjective clauses, and a high proportion of intransitive verbs.

d. In a study (Study X) of the style characteristics of narratives written by more than 200 boys and girls in grades 10, 11, and 12 of a suburban high school, five of the above stylistic factors were confirmed and at least one additional factor was observed:

I. Evaluation: similar to the factor identified in Study III.

II. Personal Affect: similar to the factor identified in Study III.

III. Ornamentation: similar to the factor identified in Study III.

IV. Abstractness: similar to the factor identified in Study III. (Identified in only the girls' matrix.)

V. Seriousness: similar to the factor identified in Study III.

VI. Optimism: defined by scales such as happy-sad, gay-morbid, and optimistic-pessimistic.

In addition there was a doublet having to do with whether evaluations of ideas were advanced by the author himself or the characters in his story.

e. In a study (Study IV) of responses of high school students to the Kent-Rosanoff free association test it was established that there is a consistent difference among individuals in their tendency to give "opposite" or "contrast" responses to stimuli that can evoke such responses; the reliability of an "opposite-giving" score was .65 over a 16-month period.

f. In a study (Study II) of "personality" ratings of 14 speech samples, there was high agreement among raters as to the characteristics of the samples. The ratings involved attributions of personality characteristics such as excitable, emotional, insecure, undependable, etc. The 14 speech samples were actually taken from recordings made by five speakers; three of the speakers, however, recorded under four different instructions: "normal," "fast," "shouting," and "soft," the presented recordings being adjusted to be equal in sound intensity level. There was no attempt in this study, however, to relate the ratings to any actual personality traits of the speakers.

g. In a study (Study XV) of styles of conceptualization in written composition, 10 scales were established: (1) alteristic-egoistic; (2) awareness of one's own cognitive processes; (3) tendency to evaluate; (4) organization of percepts; (5) progression of organization and analysis; (6) amount of inference; (7) ornamentation (similar to factor III in Studies III and X); (8) amount of digression; (9) amount of fictionalization; and (10) specific-general. Reliabilities for ratings of these scales averaged over five judges ranged from .46 to .90.

To summarize all the above studies, it may be said that many aspects of both spoken and written verbal production exhibit "stylistic" or qualitative differences. In some cases, attempts were made to relate such stylistic manifestations to actual personality traits of individuals. To these studies we now turn.

2. Findings concerning the relation of dimensions of ability and "style" to measured personality characteristics.

a. In the study (Study X) of the style characteristics of narratives written by high school students, an attempt was made to find relationships between these style characteristics and certain measures of personality--a series of self-ratings on personality scales, and scores on two paper-and-pencil personality inventories, the Guilford-Zimmerman Temperament Survey (GZTS) and the Minnesota Counseling Inventory (MCI). The results of this attempt were, however, almost wholly negative. About the only relationship found, as reflected by factor loadings, was one whereby boys with high scores on Thoughtfulness and Restraint on the GZTS had a significant tendency to write themes rated toward the "masculine" side of a masculinity-femininity scale.

b. In the study (Study IV) of responses to free-association tests, no significant relation was found between an "opposite-giving" tendency and any of the personality measures investigated. Small but significant correlations were found only for girls between the tendency to give "primary" or popular responses to non-opposite evoking stimuli and various tests of verbal ability.

c. In the study (Study XV) of styles of conceptualization, a number of low, but statistically significant, correlations were found between conceptualization styles and personality measures. Some of these correlations suggested, for example, that individuals manifesting "organization" in their picture descriptions regarded themselves as people who intend to organize matters and keep things neat.

In general, the findings concerning relations between personality and "style" characteristics of verbal productions were disappointingly meager.

3. Findings concerning the possible genesis of personality and "style" factors in home background and early childhood.

a. A large part of Study VII was devoted to these questions. The results of the analyses were summarized as follows:

> (1) Permissiveness of mothers . . . was found to be unrelated to the development of general speaking ability in older children. But permissive mothers were found to have children who achieve higher scores in language maturity. The results further suggested that boys who achieve higher speaking scores have been exposed to warm, indulgent and permissive types of child-rearing practices, whereas girls with better speaking skills were found to come from homes which were cold and strict.

(2) Parental demands were not found to be strongly related either to general speaking ability as evaluated by speech specialists or to language maturity. However, a marked relationship was discovered between parental demands and general speaking ability as assessed by teachers. The best single demand predictor of each criterion measure was Expectations in Education for the Child by the Mother.

(3) Generally, greater use of techniques of speech training in the home was associated with higher scores on general speaking ability as rated by both the speech specialists and the teachers. Use of speech training techniques did not seem to be related to Language Maturity as measured in the speech examination.

4. Findings concerning the relative effectiveness of certain methods of teaching skills in written composition.

This problem was investigated in Study VI, which used three methods of teaching in a 12-week experiment conducted in high schools: a "verbal fluency" method which emphasized methods of developing ideas for written compositions and which required large amounts of written composition exercise; a "structural grammar" method that emphasized the teaching of functional linguistic patterns, structural groups, and form classes; and a "logical structure" method that emphasized training in reasoning and the organization of thought. In a series of control classes taught by the same teachers, more conventional methods of teaching were used. Covariance analyses determined the effect of each of these methods on a series of factor scores on verbal ability tests, including measures of excellence in theme writing. There were distinctive and significant gains made by certain classes in each of the six factor areas. These significant improvements were partly due to transfer and not wholly due to direct learning, for the test battery included some verbal tasks which were not practiced upon even in the experimental classes. Each of the methods of teaching, including the control group, improved certain areas of verbal ability.

However, only the Verbal Fluency method was found, in one class, to produce superior gains in the writing of themes. It had also been hypothesized that the Verbal Fluency method would improve abilities on various fluency factors, and this hypothesis was largely confirmed when it was found that the factor scores on Word Fluency and Fluency of Expression were improved by this specific training. However, Ideational Fluency and Verbal Relations scores were not improved even though specific training techniques designed to effect such improvement were employed in the experimental class.

It had been hypothesized also that the Structural Grammar method would improve the abilities underlying the Verbal Relations factor and perhaps also the Reasoning factor. This hypothesis was borne out, for both of these abilities showed significant gains in some of the experimental classes. In addition, it was found that in one class Ideational

Fluency and Fluency of Expression were also improved even though the teaching had not been directed to develop fluency.

A third hypothesis predicted that the abilities underlying the two Reasoning factors would be improved by the Logical Structure method. This hypothesis was borne out in one class which improved in general Reasoning ability. In addition it was found that the three fluency abilities had also been improved significantly in some of the experimental classes.

In general, the study demonstrated that abilities underlying various verbal factors are amenable to improvement through special training.

Conclusions and Recommendations

Although it is easy enough to identify and establish stylistic factors in spoken and written productions, it is very difficult to find relations between such stylistic factors and personality variables. The findings of this study in this regard were almost wholly negative. The failure to find significant relations in this study should not be interpreted, however, to mean that no such relations exist. Actually, the present study barely scratched the surface in its explorations. It revealed many aspects of verbal style and ability but did very little to relate them to personality variables. The field of speech and personality is still a fertile field for research.

The present project also made a start towards identifying some of the home background and early childhood influences that might be responsible for the development of speech abilities and styles. However, in this area also much research remains to be done.

Finally, the present project contained one illustrative study of methods of teaching communication skills. It showed that certain teaching methods were able to yield significant gains on certain verbal ability tests. It is believed that useful research could be done by extending the findings of the present study to include personality variables as moderator variables.

INTRODUCTION

All societies, and particularly our contemporary civilization, depend on communication and hence upon individuals who are facile and effective in communicating information, ideas, opinions, and even literary insights. Communication skills are particularly important to a large class of "professional communicators"--teachers, journalists, clergymen, lawyers, radio announcers, writers, scientists, public executives, legislators, and many others, but it is the hope of the schools to develop communication skills in all students to the extent of their abilities. It is for these reasons that we see the enormous emphasis put upon the teaching of English composition in the schools. Even though there may be less formalized emphasis on the development of oral speech skills, the schools nevertheless concern themselves also with the oral speech performance of students in classroom discussions and reports and in a host of extracurricular activities such as dramatics and debating.

The student's intellectual ability, or lack of it, plays a large role in determining the limit to which his communication skills can be developed. If he has nothing of interest to say, or does not have the intelligence to learn how to say it, the schools cannot help him much in this respect--at least, this is the usual assumption.

It was the basic hypothesis of this study, however, that another major factor that plays a role in the development of communication skills is the student's personality. Even an able student who has something to say will often not say it well, or not say it at all, because of what we call "personality." He may suffer from feelings of inferiority, he may have unfortunate attitudes about the need for communication, he may have unhealthy desires to dominate, his communications may be chiefly a reflection of a fantasy life--these are among the possibilities.

A further hypothesis of this study was that the schools can do a better job of teaching communication skills by taking account of the student's personality, and that this can be done by teachers, preferably in conjunction with guidance counselors in certain cases.

The basic problems of the study, therefore, were (1) to investigate relations between personality and communication skills, (2) to experiment with ways of using such relationships in the teaching of communications skills, and (3) to develop practical materials and tools for the use of teachers and other school staff members.

Among specific problems that were to be investigated were:

(1) What role is played by communication variables in determining the judgments of personality made by others? Do these judgments show any more than a chance relation to the "true," underlying traits of personality of the person whose communications are being judged?

(2) In what ways can communications products be described and measured in relation to personality variables?

(3) What personality variables are relevant to communications skills?

(4) Are there any influences in the child's early history which should be taken account of in guiding later development of communications skills?

Since so much research has already been devoted to reading and listening, and since reading and listening are "passive" skills in which personality variables are not likely to be of much importance, it was felt that the chief emphasis of the research should be on speaking and writing skills.

Insofar as teachers are communicators, it was hoped that the studies might have a bearing on the training of teachers and the assessment of teacher competence.

Specific Hypotheses

1. The manner in which an individual communicates, whether in speech or writing, is a function of certain personality traits. This is also true of the content of his communication and of the circumstances under which he chooses to communicate.

2. The manner in which an individual communicates, the content of his communication, and the circumstances under which he chooses to communicate are all influential in forming others' judgments of him and his personality and in causing others to accept, to doubt, or to reject his communications.

3. The manner in which an individual communicates, as well as other aspects of communication, can be scientifically described and in some cases measured.

4. An individual can be taught to communicate in a manner which will make him more acceptable to others or make him have a greater influence on others than he might otherwise have. He can also be taught to communicate with others in such a way that he will be more articulate and effective in transmitting ideas.

5. The means which should be employed in teaching the individual to acquire desirable communication skills will depend in part on the particular personality makeup of the individual, and this personality makeup can be readily determined by means of relatively simple tests or observations.

6. Among the personality variables which may be of particular relevance to the development of communications skills are:

a. Need for achievement (McClelland)
b. Need for cognition; intolerance of ambiguity
c. Perceptual rigidity (Luchins)
d. Authoritarianism
e. "Surgency" or flow of ideas (Cattell)
f. Dominance-submission
g. Introversion-extraversion
h. Commonality of association (J. J. Jenkins)

7. Among the means that might be usefully employed in teaching the acquisition of desirable communication skills are the following:

a. Varying the content required to be communicated
b. Varying the social structure of the group within which communication is to take place
c. Varying the audience of the communication and the manner in which the audience responds
d. Varying the amount and kind of reward given to the communication
e. Presenting models of speech and writing and encouraging imitative behavior
f. Varying the units and amount of communication behavior which are to be rewarded

Substudies in the Project

Originally, the project was conceived as a rather large-scale program that would involve a number of separate but related substudies. It was to investigate the problems set forth above by a many-pronged attack, working with a number of different samples of individuals at different grade-levels. Certain detailed plans for these studies were drawn up, but as the program progressed it became evident that funds would not be adequate for carrying out all of them. Efforts were therefore concentrated upon certain major studies that were regarded as of prior importance with respect to certain other studies that might or might not be completed depending upon circumstances. Towards the end of the official contract period, a listing of the studies actually accomplished and of the studies then under way was made. The present report constitutes, in effect, a memorandum on the status of each of these substudies as of the present time, i.e., as of May 1968. For convenience, the listing of the studies is presented here with brief remarks as to the relation of each study to the overall plan.

Study I. Factor Analysis of Speech Performance Variables as Measured in Sixth-Grade Children

This study was intended to identify the major dimensions of individual differences in speech performance in a sample of sixth-grade children, as representative of children who would presumably be amenable to educational procedures, designed to improve such performance, that might result from other substudies in the present project. (See pages 15-17.)

Study II. Changes in Perceived Personality Traits as a Function of Manipulations of Vocal Characteristics

With its interest in possible personality correlates of vocal characteristics, the project here turned its attention to the dimensions of personality ratings that might be made from vocal characteristics, and to ways in which certain vocal manipulations might influence such ratings. (See pp. 17-20.)

Study III. A Factor Analysis of Literary Style

If "personality" exhibits itself in verbal productions, it might be expected to do so most strongly in literary productions. This study sought to identify major dimensions of "literary style" that might later be shown to be related to personality. (See pp. 20-23.)

Study IV. Opposite-Giving in Free Association Tests as a Personality Variable

The free association test has been a classic method of tapping certain personality dimensions. This study was focussed on the possibility that a particular mode of responding to free associations might be a valuable indicator of personality. (See pp. 24-26.)

Study V. Relationships between Oral and Written Spontaneous Compositions

This study was to have been an investigation of the possibility that style factors in verbal productions would manifest themselves in both oral and written spontaneous compositions. (See p. 26.)

Study VI. A Comparison of Three Approaches to the Training of Written Composition Behavior

One aim of the project as a whole was to develop instruments and procedures that would improve students' communicative abilities in desired ways. Study VI was conceived in this spirit, but undertook to look at problems of training in written composition from a more general point of view, by comparing three possible approaches to such training: (1) introducing a pressure towards "quantity" of verbal production by a "verbal fluency" method; (2) the teaching of "structural grammar," and (3) the teaching of logic and the organization of thought. It was thought that students' personalities might interact with the success of these methods, particularly because of the possible relation between "fluency" (which can be thought of as a dimension of personality) and method (1). (Actually, the possibility of such an interaction was not investigated.) (See pp. 27-34.)

Study VII. A Study of Home Background Variables Affecting Communicative Skills

This was a study of variables from home background and early childhood that might explain variance in the factors of speech communication skills identified in Study I. (See pp. 34-38.)

Study VIII. Factor Analysis of Verbal Ability Variables in Relation to Written Communication Skills

This was the factor-analytic phase of Study VI, endeavoring to isolate dimensions of verbal ability. (See p. 38.)

Study IX. Factor Analysis of Speech and Personality Variables Measured in Study VII

This was to have been a factor-analytic study of data collected in Study VII to clarify the nature of the relationships found there. (See p. 39.)

Study X. Relations between Personality and Written Composition Style

Having identified in Study III a number of dimensions of "literary style" in literary productions, the investigators desired to ascertain whether these dimensions could be identified in high school students' themes and if so whether they would show any relations to scores on personality tests. (See pp. 39-53.)

Study XI. Study of Judgments of Children's Personality from Voice Recordings

Study II had shown that voice and speech characteristics give certain impressions of personality variables. This study, never accomplished, would have carried this investigation farther by using larger samples of children and using actual ratings of personality. (See p. 53.)

Study XII. Studies of Speech Characteristics of Adults

This study, never accomplished, would presumably have extended the findings of Study XI to samples of adults. (See p. 53.)

Study XIII. (Because of an error of numbering in project memoranda, there was no such study.)

Study XIV. Review of the Literature of Speech and Personality

Because at the time that the project was undertaken there was not available any comprehensive review of the literature of speech and personality since that by F H. Sanford (1942), it was planned to write such a review for publication. (See p. 54.)

Study XV. Verbal Style of Conceptualization and Personality Characteristics

This was a further attempt to identify styles in written verbal production and to relate them to personality variables. In this study, however, attention was directed to styles of "conceptualization," i.e., styles of perceiving and organizing experience. (See p. 54.)

The body of this report is divided into sections describing each of the studies that were completed or partially completed as of termination of active work on the project. A considerable amount of active work on the project was done as a contribution of Harvard University even after the official termination of the contract period, that is, after June 30, 1960. Most of this additional work was done in the academic years 1960-1962.

Study I

Factor Analysis of Speech Performance Variables as Measured in Sixth-Grade Children

Introduction. At the outset of this study, little was known about the dimensions of communication skills, particularly those involving speech performance. If one were to relate personality variables to communication skills, it would be necessary to have information as to the dimensions in which speaking performance skills vary. Early in the project period, the staff became aware of a study being conducted by Dr. Calvin Taylor of the University of Utah under Air Force Contract AF 18(600)-1211, "Identification of communications skills in military situations." This was an extensive project that involved the giving of three large batteries of tests of written and spoken communications skills to several groups of Airmen and university students, with correlational and factor-analytic analyses of the data. It was hoped that this study would yield considerable information that would be useful in our study, but Dr. Taylor had not completed all his analyses, partly because of termination of the study. Of special interest would be the factor analysis of Dr. Taylor's Battery C, a group of experimental predictor tests and situational tasks. Dr. Taylor supplied to this project the correlation matrix and the unrotated factor analysis matrix. Because of his interest in methods of oblique factor rotation, the Principal Investigator of this project undertook to perform the rotation of the factors of this matrix to simple structure. Unfortunately, either because of the lack of "cleanness" of the factor structure or because of difficulties with the mathematics of the computations, a satisfactory rotation was never achieved, and this particular venture was put on the shelf until further insight was attained into methods of oblique factor rotation. The data are still awaiting further treatment. Dr. Taylor was able to submit only a very brief report of his investigation (Taylor et al., 1958) and to my knowledge he has never published the full results of this investigation. It would still be useful to analyze and publish the factor analysis of his Battery C.

Because the Taylor study was so well designed and promised to yield important information on the dimensions of communications skills in young adults, the staff of the present project decided not to undertake a comparable study, but decided instead to investigate communication skills at a younger age level, namely, the sixth grade. It was thought that this would be the earliest point at which communication skills would have sufficiently matured to make a general survey possible; at the same time, this grade level was not so far advanced that it would be impossible to trace the early history of the children in order to investigate early childhood variables in the development of communications skills.

The study that was actually done constituted one part of the doctoral dissertation completed by Michael Marge, Home background influences on the development of oral communication skills in children, Harvard University Graduate School of Education, 1959. It has been published by Marge, "A factor analysis of oral communication skills in older children," Journal of Speech and Hearing Research, 1964, 7 (1), 31-46. We give here a brief summary of the method and principal findings.

Method

Sample. This study utilized a group of children who had been studied three years earlier (when they were in the third grade) by Carroll and Austin (1957) in an investigation of "underachievement" in reading. Of the 156 children (86 boys and 70 girls) studied earlier, 143 (80 boys, 63 girls) remained accessible to the investigator. They were all of the Caucasian race, and were distributed among 16 schools in 37 classes in a middle-class suburban town (Newton, Massachusetts). However, Carroll and Austin had chosen not exactly a random sample but one that would represent the several socioeconomic classes more equally. In Marge's study, 58 children were High SES, 51 Mid SES, and 34 Low SES. In Carroll and Austin's sampling design, provision had been made to select approximately one-third "high overachievers," one-third "average achievers," and one-third "low underachievers" in reading progress with respect to predictions from mental ages. This distribution was preserved in the Marge study.

Instruments and measurements. Forty different variables having to do with oral communication skills were derived from three sources: 18 variables from a Teacher Rating Form on which each child's principal classroom teacher was to rate him on such scales as Voice Quality, Flow of Words, Articulation in Ordinary Conversation, etc.; 5 variables from a Speech Skills Battery consisting of measures of articulation ability; and 17 variables from speech specialists' ratings of the child's speech performance in an interview situation. Scores on these 40 variables for the 143 children were factor-analyzed by the principal axis method with unities in the diagonal; the factor matrix was rotated to oblique simple structure by Carroll's (1962) "oblimin" method ("biquartimin" criterion).

Findings

Seven interpretable rotated factors were isolated, as follows:

I. General Speaking Ability as Assessed by Speech Specialists

II. Motor Skill in Speaking (defined only by measures of speed of articulation)

III. Speech Dominance ("Monopolizing, dominating" behavior in oral communication situations, principally as rated by teachers)

IV. Non-Distracting Speech Behavior (defined by "variables describing verbal characteristics of speakers which do not draw attention to how the communication is presented"). This is a factor showing up in the ratings from both the teachers and the speech specialists.

V. Voice Quality, measured by both teachers' and speech specialists' ratings of "appeal of voice" and "voice quality." It also inheres in ratings of correctness of pronunciation and fluency.

VI. Language Maturity, measured by variables derived only from ratings of speech recorded in an individual interview. Grammatical usage, pronunciation, complexity of sentence structure, and vocabulary have the highest loadings on this factor.

VII. General Speaking Ability as Assessed by Teachers: "At least three important aspects of the oral communicative process are included in this factor. The mechanics of oral expression are represented by pronunciation, grammatical usage, flow of words, and articulation; the content aspect of speech is found in vocabulary, clarity of thought, communication of ideas, and wealth of ideas; and the skill techniques are indicated by ability to give impromptu talks, general behavior in oral reading, ability in peer-group communications, and ability to persuade classmates."

These factors were in general independent; the highest factor correlation was .30, between factor I and factor VII, indicating that there was some small degree of agreement between teachers and speech specialists in assessing general speaking ability. On the other hand, it was a surprise that this correlation was so low. It may be that factor I was largely independent of factor VII because its variables were derived from performance in a highly specific situation in which the child was interviewed and tested by a relatively unfamiliar examiner.

Discussion and Conclusions

It was striking that speech performance in sixth graders was so complex and multidimensional. It was apparent that a complete assessment of speech performance in sixth-graders would have to take account not only of "general speaking ability" both in the classroom and in special interview situations, but also of such variables as "Speech Dominance," "Non-Distracting Speech Behavior," "Voice Quality," and "Language Maturity."

Some of these variables or, rather, factor scores based on the results of this study, were used in a further study which constituted the second part of Marge's doctoral dissertation. In the present report, this is considered as Study VII. (See pp. 34-38.)

Study II

Changes in Perceived Personality Traits as a Function of Manipulations of Vocal Characteristics

Introduction. One of the purposes of this program of research (see introduction to the study as a whole, page 9) was to determine the role played by communication variables in determining judgments of an individual's personality made by others, and to find out whether these judgments would show any significant relation to true, underlying traits of personality. As a first step in exploring these problems, it was thought that studies should be made of the extent to which judges could agree in rating personality traits from voices, and of the extent to which such ratings could be affected by certain manipulations of vocal characteristics. There is a vast literature on the ability of raters (usually untrained) to judge personality traits or physical attributes from voices, but in general, while these ratings are highly reliable in the sense that judges tend to agree strongly, they are invalid in predicting personality traits measured in more conventional ways (e.g., through standardized personality inventories). There has been little study of what actual characteristics of voices give rise to the ratings. By studying the effect of certain manipulations of vocal characteristics it was thought that some leads could be found toward identifying the elements that give rise to stereotypal personality-voice judgments.

This study was conducted by Paul Kjeldergaard; the full report of the study is included here as Appendix A since it has heretofore been unpublished. We give at this point a brief summary of the methods and findings, together with certain comments concerning suggested further studies.

Method

Recordings. The stimulus materials for ratings consisted of 14 readings of a single 307-word passage which had been found to have relatively neutral ratings on six factors of literary style (cf. Study III). [To supplement the information in the report reproduced as Appendix A, it may be said here that the passage was taken from the writings of Matthew Arnold, an essay on the "function of criticism," in J. H. Smith and E. W. Parks, The Great Critics (3rd edition), New York: Norton, 1951, p. 612, beginning "The critical power is of lower rank than the creative . . ." and ending ". . . no manifestation of the creative power not working with these can be very important or fruitful."] This "bland" passage was selected in the hope that the content of the passage would not interact with voice-personality ratings or manipulations. (The design of the study did not, however, provide for any investigation of such interactions, since only a single passage was used.) The 14 readings were selected from a larger number obtained from 21 male Harvard undergraduates who were asked to read the passage under four sets of instructions: "normal," "fast," "shouting," and "soft." Twelve of the readings were from three speakers who appeared to exhibit greatest contrast in voice quality among the four conditions; the two other readings were from two other speakers reading under the "normal" condition. All readings were electronically adjusted to approximately equal intensity when tape-recorded for presentation.

Measurements. Ratings were to be accomplished on a semantic differential form with 17 scales selected as appearing to describe personality traits and as appropriate for use by high school student raters.

Sample of raters. The 14 recordings were played over a school public address system to classes in a senior high school in a middle-class suburban town in Massachusetts (Lynnfield). As soon as each reading had been played, each of the 357 students (in 15 classes, grades 10-12, assigned randomly to different orders of voices and scales) assigned ratings on 18 seven-point semantic differential rating scales. (Data from only 17 scales, i.e., excluding the scale *likeable-unlikeable*, were used in the analysis.)

Design. A split-unit design (Cochran & Cox, 1959) was used for the analysis of data from each of the 17 scales. This permitted testing of the significance of the differences among the 14 recorded speech samples and of interactions between the speech samples and the classes. Means and standard deviations of the ratings assigned to each of the 14 speech samples were also examined for trends.

Findings

There were highly significant differences ($p < .001$) among the 14 speech samples on each of the 17 semantic-differential scales, indicating that the raters agreed strongly on the judged characteristics of the speech samples. By examination of the means for voices recorded under different instructions, it was apparent that voices taken under the "normal" and "fast" conditions tended to be rated similarly and also that the "shout" and "soft" voices had similar patterns of ratings; further, that the "normal" and "fast" ratings tended to follow a pattern that is the mirror image of the "shout" and "soft" ratings.

On the average, the "normal" voices tended to be rated as *excitable*, *emotional*, *insecure*, *undependable*, *outgoing*, *humble*, and *careful*. Nevertheless, there were considerable differences among the five "normal" voices. The "fast" condition seemed merely to accentuate the ratings made on the "normal" condition so that the ratings of the "fast" condition on the above traits are slightly more extreme on all but two traits, *insecure* and *emotional*. (The results on these two last traits are, indeed, counter-intuitive.) The "shouting" and "soft" speech samples, on the other hand, were characterized on the average as *careless*, *messy*, *intolerant*, *cruel*, *calm*, *patient*, *sympathetic*, and *emotional*. On four scales, *leader-follower*, *dependent-independent*, *secure-insecure*, and *emotional-unemotional*, the differences among conditions were small and generally inconsistent. Only the *leader-follower* scale produced differences that were consistent from voice to voice and in the same pattern as on the scales previously discussed.

Discussion and Conclusions

This study effectively demonstrates that people, when asked to do so, make judgments about personality traits from the characteristics of voices. ("Voice" actually implies, here, not only vocal quality but manner of rendering a communication in an oral reading situation.) These judgments appear to be highly consistent from rater to rater, at least for all the traits measured here. Further, these judgments can be systematically shifted in one direction or another by changing the instructions under which the voice samples are rendered. What remains to be accomplished is the isolation of the specific variables in the speech samples that would account for the shifts in the perceived personality characteristics.

An attempted analysis of differences between manipulations by means of a sound spectrograph proved fruitless. No further efforts in the direction of isolating such variables were made because of lack of time, funds, and personnel. Nevertheless, it would appear that various linguistic and other techniques of speech analysis might reveal consistent differences that would account for the judgments.

Study III

A Factor Analysis of Literary Style

Introduction

If "personality" exhibits itself in verbal productions, it might be expected to do so most strongly in literary productions. It was therefore decided early in the program of research to attempt to find measurable objective dimensions of literary style. If such dimensions could be found in literary productions of professional writers, the results might also be applied to the compositions of, say, high school youngsters. Study III was therefore designed in two parts: IIIA, a study of dimensions of style in passages selected from a variety of literary sources, and IIIB, a study of personality dimensions ratable from samples of high school English compositions, with an attempt to link these ratings with external measures of personality.

During the contract period, only Study IIIA was completed, and even then, only a limited summary of the results found its way into print:

Carroll, John B. Vectors of prose style. In Thomas A. Sebeok (Ed.), Style in language. New York: Wiley (in cooperation with the Technology Press of the Massachusetts Institute of Technology), 1960. Pp. 283-292.

However, two internal documents relating to this study should be cited:

Carroll, John B. A sub-sub-treasury of literary style; 150 300-word passages from a variety of authors and sources. January 1958. (Dittoed)

Carroll, John B. A factor analysis of literary style. April 1958. (Mimeographed, 41 pp.) This was a preliminary report and contains a considerable body of statistical data, including correlation matrices. However, the factor rotation was considered unsatisfactory;

technical improvements in rotation methods later produced the rotated factor matrix that was presented in the published article above. A copy of this paper is included as Appendix B of this report.

It remains to complete a full report of this study. Such a report would include not only the statistical data but a full account of how each of the numerous objective variables was coded. Data on the extent to which raters agreed with the consensus of raters or were idiosyncratic in their ratings should also be analyzed and written up.

Study IIIB, the extension of Study IIIA to samples of high-school students' compositions, was renumbered Study X, discussed later in this report (see pp. 39-53).

We give here a brief summary of Study IIIA and its findings.

Method

Sample. 150 passages of at least 300 words each were assembled from a wide variety of sources according to a design which called for a certain number of passages from each of such categories as Adventure Narrative, Advertisements, Aesthetic Criticism (Art, Music, Literary, etc.), Anecdote, Biography, . . . Travel Guides, and Writing Assignments (high school). Restrictions were: originally written in English, written after the year 1800, and self-contained in 300 words. These passages were typed, one to a page, duplicated, and bound in a collected work entitled "A sub-sub-treasury of literary style."

Measures. There were 29 subjective measures, consisting of the mean ratings (averaged over eight judges) on semantic-differential scales especially chosen to tap various aspects of style. There were 39 objective measures of style, including such measures as number of paragraphs, number of syllables, number of sentences, standard deviation of sentence length, number of clauses, clause complexity index, proportion of noun clauses to all dependent clauses, and so on. Nearly all the measures had reference to one or another grammatical category or phenomenon. Scores of the passages on the objective measures were obtained by specially trained coders.

Method of analysis. Wherever feasible, reliability estimates were obtained for the measures--by the intraclass correlation method for the raters' judgments, in the case of the subjective measures, and by the split-half method, in the case of the objective measures. Before computing intercorrelations, many of the measures were subjected to logarithmic or arc-sine transformations. The correlation matrix was factor-analyzed by the centroid method (with communality estimates in the diagonal of the matrix). Seven factors were rotated by the author's oblique biquartimin method. Factor scores were obtained for each of the factors, and "profiles" for each passage on the seven factors were plotted.

Findings

Reliability coefficients for the 29 averaged subjective ratings ranged from .64 for the scale weak-strong to .92 for the scale humorous-

serious, with a median at .80. Among the 39 objective measures, only 31 could be assigned reliabilities; these ranged from .17 for *standard deviation* of sentence length to .88 for mean tense, with a median at .58.

Six interpretable factors emerged from the factor analysis:

I GOOD-BAD: defined almost solely by subjective scales such as *good-bad*, *pleasant-unpleasant*, *strong-weak*, *interesting-boring*, etc.

II PERSONAL-IMPERSONAL: measured by subjective scales such as *personal-impersonal*, *intimate-remote*, *emotional-rational*, and *vigorous-placid*, and also by objective measures such as *number of personal pronouns*, *number of pronouns*, and (negatively) *number of syllables*.

III ORNAMENTED-PLAIN: measured by subjective scales *florid-plain*, *wordy-succinct*, *lush-austere*, *affected-natural*, and *complex-simple* as well as objective variables such as *length of sentences*, *length of clauses*, and *proportion of common nouns preceded by adjectival or participial modifiers*.

IV ABSTRACT-CONCRETE: measured by subjective scales *subtle-obvious*, *abstract-concrete*, *profound-superficial*, *original-trite*, and *elegant-uncouth*, and certain objective indicators such as a low proportion of numerical expressions, a low number of determining adjectives and pronouns like "this," "each," etc., a high proportion of noun clauses, and a low number of participles.

V SERIOUS-HUMOROUS: measured by subjective scales *earnest-flippant* and *serious-humorous* and by such objective indicators as a low proportion of indefinite articles, a high proportion of indefinite and quantifying determining adjectives, and a high number of determiners (all associated with the *serious* end of the scale).

VI CHARACTERIZING-NARRATING: measured exclusively by objective indicators: a low proportion of transitive verbs, a high proportion of copulative verbs relative to all verbs, a low number of proper nouns, a high proportion of adjective clauses, and a high proportion of intransitive verbs. (This interpretation of the factor, incidentally, could be checked by correlating the factor scores with ratings of characterization vs. narration.)

Discussion and Conclusions

It cannot be claimed that this study tapped all possible dimensions of style. As was pointed out by Paul Diederich in a paper on factors in judgments of writing ability (Diederich, French, & Carlton, 1961), other dimensions of style might have been obtained through the use of further subjective and objective measures. Nor can it be claimed that the dimensions identified here adequately represent the aspects of style that truly make the difference between great literature and mediocre literature. Nevertheless, some of the hopes in which the study was undertaken seem to have been realized: the study points to some of the more obvious characteristics of prose that have to be observed, mentioned, and duly noted before the literary critic can really go to work.

The "style" dimensions identified here also may conceivably have relationships to the personalities of writers. Although a really skillful writer might be able to vary his style along any one of the dimensions, a person whose written style exemplifies a consistent style profile could possibly be shown to have certain corresponding personality characteristics. For a preliminary study of this hypothesis, see Study X.

The study also has a bearing on the measurement of readability. Before his death, Professor Irving Lorge supplied the writer with Lorge Readability Ratings for each of the 150 passages in our Sub-Sub-Treasury of Literary Style. (The Readability Rating for passage 48, a selection from a legal document that consisted of a single unfinished sentence, was unusable because it gave the meaningless grade equivalent of 23.65.) The various elements of Lorge's index, and the index itself, gave the following correlations with factor scores from the style study for 149 passages:

			FACTOR			
	I	II	III	IV	V	VI
Lorge measures	(Good-Bad)	(Personal-Impers.)	(Ornate)	(Abst.-Conc.)	(Serious-Humorous)	(Characterizing-Narration)
Av. Sentence Length	-.091	-.169	.597	.052	.140	.169
Ratio of Prep. Phrases	.026	-.555	.501	-.100	.259	.176
Ratio of Hard Words	.008	-.404	.487	-.138	-.002	.020
Readability Index	.013	-.393	.714	-.088	.126	.218

Evidently, the Lorge Readability Index is a composite indicator of the "ornamental" and "impersonal" aspects of style that make for difficulty in reading. These results were discussed further by Lorge in a presentation at the 1960 ETS Invitational Conference on Testing Problems (Lorge, 1961; also reprinted in Anastasi, 1966, pp. 597-606). It would be desirable, however, to publish a full report of these findings.

Study IV

Opposite-Giving in Free Association Tests as a Personality Variable

Jenkins (1960) had suggested that commonality of responses to free-association tests might be an important indicator of personality, and had assembled certain limited data supporting this suggestion. In attending a conference at the University of Minnesota on Associative Processes in Verbal Behavior (Jenkins, 1959), however, the principal investigator was prompted to speculate that commonality as usually measured by the number of "primary" responses a subject would give to a word-association test might be a complex variable, partly dependent upon his tendency to give "opposites" or opposite-like responses to certain words that are highly likely to evoke such responses. An examination of word-association norms (Russell & Jenkins, 1954) revealed that opposites are in all cases among the five most frequent responses to words that indeed have opposites; in 28 out of 40 words in the Kent-Rosanoff list opposites are the most frequent responses. It was thus hypothesized that there might be consistent and reliable differences among Ss in their tendency to give opposites to opposite-evoking words, and that these differences would be relatively independent of the tendency to give "primary" responses to words which do not have opposites. If such consistent individual differences could be identified, it might be easier to relate them to personality variables.

Although responding to free-association tests is not a typical communication skill, there has been a wealth of research demonstrating that free-association responses are indicators of mental processes important in verbal behavior and learning.

The first task was to study opposite-giving behavior in free-association tests in order to confirm or disconfirm the hypothesis of consistent individual differences in this behavior. This study (Study IV-A) was performed and reported on in the following article:

Carroll, John B., Kjeldergaard, Paul M., & Carton, Aaron S. Number of opposites versus number of primaries as a response measure in free-association tests. Journal of Verbal Learning and Verbal Behavior, 1962, 1 (1), 22-30.

Study IV-A had several phases. In Phase I, project staff members classified words in the K-R (Kent-Rosanoff) list into three classes: (1) adjectives having opposites; (2) nouns or verbs having opposites; and (3) words not having opposites. Classes (1) and (2) were labeled opposite-evoking stimuli (OES). All words considered appropriate opposites to the stimuli were listed. The results were confirmed by giving a somewhat similar task to 42 sophomore women at Simmons College (Boston). From these data a scoring key for "opposites" was developed for use in later analyses. The results were used to perform analyses of the Russell-Jenkins free-association norms, supporting the conclusion that "commonality" is, in large part, a function of the tendency on the part of the Ss to respond to a subset of stimulus words (OES) with responses which may be behaviorally defined as opposites." In Phase II, it was shown that in a further sample of free-association responses from 46 Simmons College undergraduates, opposite-giving tendency was consistent (r = .84) from the first half to the second half of the K-R list, while primary-response giving tendency to nonopposite-evoking stimuli showed a coefficient of only .46. The two types of scores correlated only to the extent of .26 (not significant for this sample). In Phase III, analyses were made of free-association responses to the first 50 words of the K-R list by 344 suburban (Lynnfield, Mass.) high-school students, and a follow-up with the same test on 211 of these students 16 months later. The test-retest correlation for the opposite responses was .65, for the primaries in response to nonopposite-evoking stimuli this coefficient was .36. It was also found that high opposite-givers tended to give different responses to the nonopposite-evoking stimuli from those given by persons who never gave opposites. For example, an "opposite-giver" will probably give moth as a response to butterfly while a "nonopposite-giver" will most likely give insect to the same stimulus.

A second task was to explore the relations between opposite-giving tendencies and personality variables. This study (Study IV-B) was performed and reported on in the following article.

Kjeldergaard, Paul M., & Carroll, John B. Two measures of free association response and their relations to scores on selected personality and verbal ability tests. Psychological Reports, 1963, 12, 667-670.

In Study IV-B, 231 senior high school students (rather heterogeneous in ability and socioeconomic class status) were given two personality tests, the Minnesota Counseling Inventory and the Guilford-Zimmerman Temperament Survey. These were the same students as had been used in the follow-up phase of Study IV-A, and they had, of course, been given the K-R test on both occasions. They had also been given, 16 months earlier, 27 verbal paper-and-pencil ability tests in connection with another study (Study VI) in this same program of research. The purpose was to correlate the association-test scores with both the personality inventory subscores and the verbal ability test scores. To quote from the report, "Product-moment correlations between these scores [the association-test scores] and the personality measures were consistently low; only six of the 72 rs (18 personality scales, two K-R scores, two sexes) reached significance at the .05 level. All these [significant] correlations were from the girls' matrix; the matrix for boys failed to yield any significant correlations. In both matrices, male and female, the magnitude and sign of the correlations for each of the K-R scores were similar.

"A quite different correlational pattern emerges if one examines the interrelationships between the 26 verbal tests and the two K-R scores. Here the correlations with the opposite score are virtually all very close to zero, whereas the correlations with the nonopposite primaries score range from 0.00 to +0.30, 22 of the 26 correlations being significant at the .05 level [the median r being .18] . . . . None of the relationships is of a sufficient magnitude to warrant excitement, but the presence of consistent differences in the two arrays of correlations strongly supports the contention that the tendency to give or not to give opposites is a verbal habit different from the tendency to respond with primary responses to stimuli which do not evoke opposites. This conclusion is further supported by the low correlations between the two K-R scores: +.34 (N = .90) for the boys, and +.36 (N = 154) for the girls."

Kjeldergaard further showed (Kjeldergaard, 1962) that commonality of scores of S̲s instructed to give opposites were as high as commonality scores of S̲s who were told to respond with the most popular responses.

This phase of the project may be regarded as completed. It established (1) that there are reliable individual differences among S̲s in the tendency to give opposite or opposite-like responses to free-association tests, (2) that this tendency has a relatively low correlation (about .35) with the tendency to give primary responses to nonopposite-evoking words; (3) that neither of these tendencies shows any substantial relationship to scores on two personality inventories (the Guilford-Zimmerman Temperament Survey and the Minnesota Counseling Inventory); and (4) that opposite-giving tendency has hardly any relationship to any of several verbal ability factors, but that the tendency to give primaries to nonopposite-evoking words shows small but generally positive correlations with verbal ability tests (median r = .18, range from -.13 to .30 in a set of 26 verbal ability tests).

Study V

Relationships between Oral and Written Spontaneous Compositions

In the original project proposal, Study V was to be "an experimental study on the teaching of oral communication skills," but planning of such a study was delayed because of the preoccupation of the staff with other studies. In the third year of the project, it was realized that time and funds would not permit undertaking this study, and therefore it was dropped from the plans.

As a substitute for this, Dr. Robert Gardner, a Research Associate on the project in its third year, proposed to make a study of relationships between oral and written spontaneous compositions with respect to the style factors that had been identified in Study III. To this end, he made arrangements to have from 100 to 150 students at Lynnfield (Mass.) High School given an oral picture narration test in which the students were directed to study a picture for a few minutes and then to tell a story about it. The data were collected, but after examination of the transcribed stories it was decided that there was too little variation in them, with respect to literary style factors, to make ratings possible. This particular project, therefore, was dropped. (See Study X, however, for a somewhat similar project in which relations between ratings of written themes from the Lynnfield students and personality measures were investigated.)

Study VI

A Comparison of Three Approaches to the Training of Written Composition Behavior

Introduction

In the original project proposal, Study VI was planned as "an experimental study of the elicitation and training of written composition behavior," and it was suggested that a more natural style of writing might be obtained if students were asked to write under considerable pressure and with lowered standards of quality. After study of the literature on the teaching of writing ability, this plan seemed less attractive than it had been originally. A doctoral candidate, Frederic D. Weinfeld, took over responsibility for the project, and after considerable discussion with other staff members decided to modify the plan by the addition of two other treatments besides (1) quantity production, namely, (2) teaching of "structural grammar," and (3) the teaching of logic and organization of thought. Further, treatment (1) was altered to emphasize the teaching of various techniques for getting "fluency" in writing. Extensive pretesting and posttesting of students in various verbal abilities as well as theme-writing ability was to be done in order to study what transfer effects of the various treatments could be observed.

This turned out to be a major enterprise because of the extensive testing that was done and the (12-week) duration of the experimental treatments. Experimental and control classes were set up in both Concord and Lynnfield high schools. The work was done in the academic year 1958-59, i.e., in the second year of the study, and Mr. Weinfeld was able to present his doctoral thesis in the spring of 1959, entitled, "A factor analytic approach to the measurement of differential effects of training: an evaluation of three methods of teaching English composition." It may be of interest to note that the test data collected in Lynnfield were used in several other studies conducted in this program of research, notably Study IV.

As far as the Principal Investigator is aware, Dr. Weinfeld has not published the results of this study in the standard literature. His thesis, however, is available from the Harvard Graduate School of Education library.

To summarize this study, we shall quote from the Abstract included in the thesis.

"The teaching of English composition has been selected as the field to be investigated in this study primarily because so little empirical research has been done in this important area. Three experimental methods of teaching have been devised, based on many of the suggestions, findings and proposals made in the literature: the Verbal Fluency method, taught predominantly in the 9th grade; the Structural Grammar method, taught in the 10th grade; and the Logical Structure method, taught in the 11th grade.

"The Verbal Fluency method of teaching English composition followed from the strong belief that students learn writing only by writing and not by doing grammatical drills. The basic idea was to have the students write as much and as often as possible. Some writing was done every day. It was hoped that such quantity writing together with other verbal exercises would increase the writing ability and the verbal and ideational fluency of the student. The emphasis at first was on quantity production of writing; as the student developed ease and flow in his writing the qualitative aspects were stressed. In order to relieve the teacher from correcting the extra volume of written work which was produced, class correction of papers was attempted as well as cooperative correction of selected student papers. The latter technique served a double purpose. On one hand it supplied the student with related material for grammatical drill; on the other hand it served as a means for developing clarity in writing and exactness in expression. The approach to the teaching of grammar in this method was a functional one. Only the more common major errors made by the students were selected by the teacher for special or further elucidation in class. There was no formal teaching of grammatical principles, rules, usage, or sentence structure, as such. In the writing of papers and during the correction of papers emphasis was placed upon saying what is meant. Exact expression of words and ideas, diction, clarity, and rhetoric were stressed. The student devoted himself to trying to develop a facility in finding the exact words to express his thoughts.

"The class time in the Verbal Fluency method and in the other experimental methods was divided into four half-period sections. One half-hour, or half-period, was devoted to class exercises designed to stimulate and develop verbal and ideational fluency. Word games, puzzles, training in synonyms and antonyms, word and idea listing, word exercises involving the use of the dictionary and of Roget's _Thesaurus_, and similar exercises were carried on during this time. One half-hour was spent in writing in class. Another half-hour was spent in class correction of papers. The final half-hour was consumed by cooperative correction of selected student papers. Some writing, even if only a short paragraph, was expected of these students every day.

"The Structural Grammar method emphasized the teaching of functional linguistic patterns, structural groups, and form classes. Formal grammatical nomenclature and rules were replaced by structural and functional language patterns. It was hoped that the training in these structural principles of language would give the student a better and more fundamental understanding of the English language and that he would be able to use this knowledge in his own writing. The teaching materials of the Structural Grammar method were presented by the teachers in a formal manner. In the writing of papers and during the period of cooperative correction, emphasis was placed on grammatical patterns, good usage, and sentence structure.

"The Structural Grammar teachers devoted one half-period to class instruction in the basic principles of language structure using Robert's _Patterns of English_ (1956) as their text and guide. One half-period was spent on class exercises and oral and written drill on the structural principles taught. A half-period of class writing was devoted to relating the formal structural grammar instruction with the actual writing skills of the students. The final half-period was devoted to cooperative correction of student papers.

"The third method, the Logical Structure method, had as its underlying precept the concept that good thinking underlies good writing. Training in reasoning and logic and in outlining and organization was considered to be beneficial to student writing. Direction and instruction in reasoning, clear thinking, and organization would enable the more mature high school student to improve his written compositions. The approach to the teaching of grammar in this method was a functional one. Only the more common major errors made by the students in their papers were discussed. There was no formal teaching of grammatical principles as such. Clear thinking was stressed at all times and attention was directed to the reasoning process and the meaning of words. The written work has checked primarily for its organization and for the thinking involved. Stress was placed upon explaining what was thought and the reasons which led to such conclusions. It was hoped that a careful and thoughtful approach to writing would greatly improve its quality.

"The Logical Structure method devoted one half-period to class instruction in various aspects of clear and critical thinking, such as: formal logic, syllogisms, definitions, false analogies, scientific method, and inductive and deductive errors. One half-period was spent in class exercises, oral and written, in the above material. The next half-period was devoted to training in the development and use of outlines in theme writing. The final half-hour was spent on the structural elements of a written composition. This included standard units in the topic sentence, paragraph organization, and theme unity.

"The control groups consisted of those classes which were taught by the teacher's own standard method of procedure. In these classes the individual teacher used any method of traditional teaching as long as it was distinctive from any of the experimental methods.

"The teachers of each method met together once a week in a small workshop where they reported their progress and discussed techniques, methods, and materials. The experimental teaching was conducted along the lines of action research. That is, ideas which in practice worked out poorly in the classroom were discarded. A successful idea developed by one teacher was communicated in the workshop to the other teachers. Successful ideas and methods used in one school system were passed along to the parallel workshop in the other school system. Each teacher received a directive outlining the general procedures to be followed. Mimeographed materials were prepared and distributed to the teachers. New materials were prepared whenever the teachers voiced such needs. Word games and exercises together with topics for themes were distributed to the Verbal Fluency teachers. Selections and exercises from the Roberts' text were mimeographed for class use in the Structural Grammar method.

Lesson plans for the teacher were also prepared. The teachers of the Logical Structure method received a bibliography of pertinent books and articles as well as a guide to clear and critical thinking in lesson plan form.

"Approximately two-fifths of the weekly class time (two periods) was set aside for experimental teaching. This is the class time in which the teacher normally would have taken up grammar and composition. The training phase of the experiment was approximately ten weeks.

"Two school systems, Concord and Lynnfield, Massachusetts, participated in this study. There were eleven cooperating teachers in the two schools, who were randomly assigned to their respective experimental methods. These teachers did not have any previous training or experience with the experimental methods. They varied in ability, experience, and interest in the experimental methods. The subjects of the experiment were approximately 800 students, boys and girls, of the entire 9th, 10th, and 11th grades in the Concord and Lynnfield High Schools. Most of the students took part in the pretesting and posttesting sessions, which took place in September and in February, respectively.

"The experiment was replicated by conducting it in a parallel fashion in the two schools at the same time. In each grade, in the two schools, one teacher was chosen as the teacher for the primary study. These teachers taught a control class and also one, or often two, of their classes by an experimental method. In addition to the six teachers in the primary study there were two alternate teachers. The other three teachers participated in a secondary study which will be reported at a later date.

"The selection of the test battery was determined on the whole by the fact that a factor analysis of the data was proposed. Since the study was concerned with English composition, the various known factors which might be involved in the ability to write a composition were selected as relevant to the investigation. The various fluency factors, Word Fluency, Ideational Fluency, Fluency of Expression, and Associational Fluency, were considered relevant to this study because of the type of training involved in the Verbal Fluency method. The Verbal factor was of course selected since this ability is very probably involved in writing ability and in all experimental methods including that of Structural Grammar. Since the Logical Structure method involved training in reasoning and organization, it was assumed that the factors of Inductive and Deductive Reasoning might be functioning in writing ability and so these two reasoning factors were also selected. Twenty-three tests, which had been used in previous factor analyses and whose factorial composition was known, were chosen as measures of the seven selected factors. A theme, which was to be written by the students and rated on five separate scales, was also included in the test battery.

"The paradigm of this study included the battery of pretests administered to all the students of the two school systems, a ten-week period of classroom training using the three different methods of teaching English composition, and the identical test battery administered over again as the posttests. The resulting test scores were correlated and then factored. Seven factors were extracted by the principal axis method of factor analysis. The first six factors were then rotated to psychological significance by Carroll's Oblimin analytic method.

"An exceptionally clear factorial structure emerged after the rotation. Most of the tests were pure tests and had a major loading on only one factor. A few tests had minor loadings on a second factor, and only one test was complex, having minor loadings on three factors.

"Factor A was identified as Theme Writing since all four theme ratings were loaded on this factor. No other tests had loadings on this factor. It is probably the same factor as the Writing Skill factor found by Harris (1948), which was also defined by similar subjective ratings on a sample student theme.

"Factor B was very clearly the Ideational Fluency factor. The six tests postulated to measure Ideational Fluency all had high loadings on this factor. In addition two tests postulated to measure Fluency of Expression had moderate loadings on this factor. Factor C appeared to be Thurstone's (1938) factor of Verbal Relations. In addition to the tests of the Verbal factor, the Words in Sentences test had a fairly high loading on this factor also. Factor D was without question the familiar Word Fluency factor. All tests of Word Fluency, including the reference tests, were loaded on this factor. Factor E was identified as the composite Reasoning factor. All the tests postulated to be measures of both the Inductive and Deductive Reasoning factors were loaded on Factor E.

"The sixth Factor F was the only factor which presented any difficulty in interpretation. There seemed to be two separate abilities involved in these tests. One was the speed of producing words fitting certain general restrictions, and the other ability was the production of specific words which are appropriate to a given concept. This factor might be considered to be the Speed of Eduction of Appropriate Expression; however, it was considered that this factor was similar enough to the factor of Fluency of Expression found by other investigators to be identified by that name.

"The pretest factor scores for each individual student on the six factors were computed by Harman's (Holzinger & Harman, 1941) "Shortened" method using the pretest scores and the factor score coefficients derived from the factor matrix. Then the posttest factor scores for these students were also computed using the posttest scores and the same factor score coefficients. Both the pre- and posttest factor scores were computed on the basis of the initial factor matrix so as to enable their later comparison.

"The experimental and control classes were now compared on the basis of their standardized and transformed factor scores. For every pair of classes a separate two-way analysis of variance with covariance adjustments was performed for each factor. The posttest factor scores of the classes were adjusted on the basis of initial ability as shown by their pretest factor scores. The null hypothesis tested stated that there was no difference between the posttest factor scores of the experimental class and those of the control class taught by the same teacher, the classes being matched statistically on the basis of pretest factor scores.

"The covariance analyses revealed that there were distinctive and significant gains made by certain classes in each of the six factor areas. These gains made by the students in the various verbal abilities were gains over and above the comparison class taught by the same teacher. These significant improvements in the verbal abilities were partly due to transfer and not wholly due to direct learning, for the test battery included some verbal tasks which were not practiced upon even in the experimental classes. Gains on these tests, therefore, were partly caused by the transfer from learning activities in the classroom which had some underlying similarity to the test tasks.

"The spread and amount of improvement effected varied according to the individual teacher and according to the method of training used. Each of the methods of teaching, including the control group, improved certain areas of verbal ability. Certain teacher differences were evident as well as differences in classes of various levels of ability. Two teachers, although using the same method, did not necessarily produce the same results since their teaching and method of presentation of material was modified by their own ability, personality, interest, and previous manner of teaching. Nevertheless, it was found that each of the three experimental methods could be taught effectively by ordinary classroom teachers without any special training.

"It was hypothesized that each of the three experimental methods would be superior to a conventional method of teaching English composition in the writing of themes. Only the Verbal Fluency method was found, in one class, to produce superior results in the writing of themes. However, the lack of a significant difference between the classes does not suggest that the experimental groups did not gain; rather, it means that the gains of the two groups were approximately equal.

"One hypothesis had stated that the Verbal Fluency method would improve the abilities underlying all three fluency factors and even perhaps the Verbal Relations factor. Most parts of this hypothesis were borne out. The factor scores on Word Fluency and on Fluency of Expression were improved by the specific training as expected. However, Ideational Fluency was not improved by this method even though specific training techniques were employed in the experimental class, nor was the Verbal Relations ability improved. Finally, the Writing ability, as measured by factor scores, was improved in one class taught by this method.

"A second hypothesis predicted that the Structural Grammar method would improve the abilities underlying the Verbal Relations factor and perhaps the Inductive Reasoning factor. This hypothesis was borne out.

Both of these abilities were improved in some of the experimental classes. In addition, it was found that in one class Ideational Fluency and Fluency of Expression were also improved even though the teaching had not been directed to develop fluency.

"A third hypothesis predicted that the abilities underlying the two Reasoning factors would be improved by the Logical Structure method. This hypothesis was borne out in one class which improved in general Reasoning ability. In addition it was found that the three fluency abilities had also been improved significantly in some of the experimental classes. Evidently the training in the Logical Structure method, which included training in words and their meanings and connotations, brought about this unexpected increase in the three fluency factors.

"Apart from the superior improvement derived from the three experimental teaching methods, the control, or conventional method of teaching also produced superior improvement in certain areas in some classes. The control group as taught by one 9th grade teacher produced a superior improvement in Ideational Fluency and in Verbal Relations. A 10th grade control class improved in Theme Writing ability and another Non-College control class improved in Ideational Fluency and in Word Fluency. The control class of an 11th grade teacher improved in Reasoning and Fluency of Expression, as did the control class of a 9th grade alternate teacher. These control class gains were mostly in Concord and were generally sporadic. They do not represent any trend, but rather variations due to individual methods of instruction used by the teachers in their 'regular' methods of teaching.

"Another stated purpose of this study was to determine whether the abilities underlying the factors are amenable to training. It was hypothesized that the abilities represented by the cognitive factors are capable of being improved by special training. This hypothesis was borne out completely. Every factor ability was found to have been improved by at least one of the three methods. That is, the factor scores increased significantly over the normal increase due to learning and maturation. It was demonstrated that when an ability had been improved, most of the tests highly loaded on the same factor had also increased.

"Once improved, a factor ability is capable of improving performance on other tasks which utilize this ability to some degree. Knowledge of the teaching methods causing such an improvement is therefore of great value to education. The factors found most amenable to improvement are the three fluency factors. The other broader factors are also capable of improvement but perhaps require more training or specialized training.

"Another hypothesis stated that the cognitive factors act as the common elements in the transfer situations. This hypothesis was not adequately proved; nevertheless, it does appear tenable since none of the results of the study conflicted with it. The hypothesis may possibly be validated by a replication of this study or by using a different experimental design. This hypothesis was partially validated, but not rigorously, in that in several cases an increase in the mean factor score of a group of individuals resulted in the corresponding increase in the mean score of all tests loaded on that factor.

"The factor analytic approach to the problem of determining the effects of specific training appears to be a useful tool with which to proceed in further investigations of other aspects of school learning. The research design used in this study has developed, it is believed, into a sensitive instrument for measuring and assessing individual abilities and differences. Such a design could also be used to investigate the differential effects of training in other cognitive ability areas as well. It remains for future educational research to proceed along these lines, making use of the factorial approach to learning and to transfer, and to investigate the various conditions, teaching methods, and curriculums which would produce the maximum amount of improvement. Various teaching methods need to be reappraised in this light. This factorial design, by noting the areas of improvement, seems to be an appropriate technique for examining the various changes due to specific teaching and for determining what teaching methods would be best suited for the improvement of certain abilities."

This study is considered complete.

Study VII

A Study of Home Background Variables Affecting Communicative Skills

One of the most important studies included in this program of research was concerned with home background and early childhood experiences that might be shown to be related to the development of communication skills, particularly those in speech behavior. This study constituted the second part of the doctoral thesis undertaken by Michael Marge, a Research Assistant during the first two years of the project, already mentioned in connection with Study I. That is, having isolated a number of significant dimensions of communication behavior in Study I, Marge then turned to the analysis of data on the early childhood experiences of his sample in an effort to find relationships.

The results of this study were reported in Marge's doctoral dissertation:

Marge, Michael. Home background influences on the development of oral communication skills in children. Unpublished Doctor's Thesis, Harvard Graduate School of Education, 1959.

and also in an article published in a journal:

Marge, Michael. The influence of selected home background variables on the development of oral communication skills in children. Journal of Speech and Hearing Research, 1965, 8, 291-309.

For a summary of this study, we quote from the abstract in Marge's thesis. Part of this abstract covers the factor-analytic study that has already been summarized under Study I.

"The study of verbal behavior has achieved a position of increasing importance in the minds of child psychologists and educators. Language ability conceived as an integral part of the personality structure of an individual has been the source of fruitful research about general categories of human behavior. Therefore, as in the case of the research reported here, the development of language is studied in its relationship to antecedent influences on personality development. The interest of this investigation concerns parental behavioral and attitudinal variables in their relation to the growth and pattern of child behavior. Specifically, the study focuses upon certain home background factors as possible antecedents of the development of speaking skills in preadolescent children.

"An extensive review of the clinical and research literature of home background influences on personality and language development led to the conclusion that an association between early home practices and parental attitudes on the one hand, and the child's language growth, on the other, does exist, though a direct cause-effect relationship is generally not reported. Many intervening influences, some which have never been identified, either lessen or accentuate the effects.

"Three theoretical constructs representing home background influences--Permissiveness vs. Strictness, No Demands vs. High Demands, and Techniques of Training for Implementing the Demands--were selected as the antecedent variables. The first antecedent variable, that of Permissiveness vs. Strictness, refers to the degree to which the parent circumscribes and limits the child's physical and psychological behavior. The second construct, No Demands vs. High Demands, refers to the kinds of standards of behavior and achievements which the parent sets for the child at different ages and developmental stages. Techniques of Training, the third theoretical construct, represents all the practices which the parent employs in order to implement her demands. Each of the three constructs contained a number of specific scales, which, in combination, were felt to represent the dimension underlying the construct.

"The experimental sample was comprised of 143 eleven year old subjects, their parents and their teachers. Although extensive data were collected about these youngsters when they were intensively studied three years previously in the Harvard-Newton Reading Study, further information about specific home influences on speech development and the speaking abilities of the children had to be obtained in order to meet the needs of the research design.

"Three basic testing instruments were developed: the Parent Questionnaire, the Teacher Rating Form, and the Speech Experts' Rating Form. Procedures for testing included the group administration of the Parent Questionnaire, which requested information about the child-rearing practices and attitudes of the parents toward speech, the administration of the Teacher Rating Form, which requested each teacher of the subjects in the study to observe the speech and personality characteristics of the child and rate him on a number of behavior scales, and the administration of the Speech Skills Battery, which was conducted by the experimenter in both individual and group sessions with the children and which yielded a number of important scores of speech skill as well as a tape recording of the subjects' speech which was later rated by two speech specialists on the Speech Experts' Rating Form.

"An intercorrelation matrix of forty speech variables felt to represent the dimension of speaking ability was computed. This was submitted to a factor analysis by means of the principal axes method. The resulting factor matrix was then rotated by the Carroll oblimin method.

"Seven factors were extracted which were interpreted as follows:

"Factor 1 - General Speaking Ability as assessed by Speech Experts: described by a need for oral expression, free from distraction and hesitation phenomena, and originating from an extensive supply of linguistic responses.

"Factor 2 - Motor Skill in Speaking: described by tasks calling for the rapid repetition of syllables.

"Factor 3 - Speech Dominance: described by the monopolizing, dominating, overwhelming type of behavior in oral communicative situations.

"Factor 4 - Non-distracting Speech Behavior: described by verbal characteristics of speakers which do not draw attention to how the communication is presented.

"Factor 5 - Voice Quality: described by articulation, pronunciation and fluency as well as pleasantness of voice.

"Factor 6 - Language Maturity in Speech Examination: described by grammatical usage, pronunciation, complexity of sentence structure and vocabulary - speech elements which are criteria of the level of language development of an individual.

"Factor 7 - General Speaking Ability as Assessed by Teachers: similar to Factor 1 in the type of ability represented. Variables loading highly on this factor are from the Teacher Rating Form.

"Three of these factors, Factors 1, 6 and 7 were considered most pertinent for the purposes of this study and therefore, factor scores were computed for each of the subjects on the three factors. These factor scores were used as criterion measures of speaking skill.

"Intercorrelations of the antecedent variables and the three criterion measures were obtained and studied in view of the formulated hypotheses which predicted positive curvilinear relationships* between the 'permissiveness' and 'demands' variables on the one hand, and Factor Scores 1 and 7 on the other, while linear relationships were expected between these antecedent variables and Factor Score 6. Technique variables were expected to relate linearly with each of the three criterion measures.

"The following are the results of the analyses:

"(1) Permissiveness of mothers as defined by this thesis was found to be unrelated to the development of general speaking ability in older children. But permissive mothers were found to have children who achieve higher scores in language maturity. The results further suggest that boys who achieve higher speaking scores have been exposed to warm, indulgent and permissive types of child-rearing practices, whereas girls with better speaking skills were found to come from homes which were cold and strict.

"(2) Parental demands were not found to be strongly related either to general speaking ability as evaluated by speech specialists or to language maturity. However, a marked relationship was discovered between parental demands and general speaking ability as assessed by teachers. The best single demand predictor of each criterion measure was Expectations in Education for the Child by the Mother.

"(3) Generally, greater uses of techniques of speech training in the home did lead to higher scores on general speaking ability as rated by both the speech specialists and the teachers. Use of speech training techniques did not seem related to Factor Score 6, Language Maturity in the Speech Examination.

"(4) The difference between the ratings of speech specialists and teachers was explained in terms of the nature of the test situation and of the types of cues available to each in the process of evaluating the speaking ability of the subjects. The measures which constitute Factor 1 are speech experts' ratings of a two-minute impromptu talk given by the subject in a personal speech examination by the experimenter individually. Factor 7 is comprised of measures based on teachers' ratings of the subject's speech performance in the classroom. In these ratings teachers were felt to have relied, in part, on cues from their knowledge of the child's IQ, home background, social popularity and achievement, whereas the speech experts had to rely only on cues furnished by a speech recording.

"Suggestions for future research include the development of antecedent variables represented by factor scores obtained from a factor analysis of home background variables; longitudinal studies of child language development; the study of peer-group influences on the speech behavior of the preadolescent; a study of speech training methods which can be readily adopted by the public school to help improve speaking skills in children; and an investigation of the language abilities of the mother, father and child in their relation to home background influences on language growth."

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*"Positive curvilinear relationship" is used here to mean that as the antecedent variable increases, the consequent variable increases up to a certain optimum point; after that point, as the antecedent increases, the consequent decreases.

This study is regarded as complete.

Study VIII

Factor Analysis of Verbal Ability Variables in Relation to Written Communicative Skills

The number VIII was assigned to the factor-analytic phase of Weinfeld's study, already described under Study VI, which see.

Therefore, this study is regarded as complete.

Study IX

Factor Analysis of Speech and Personality Variables Measured in Study VII

After the completion of Study VII (Michael Marge) it was thought that the relations between the speech variables and the personality and background variables might be clarified by a factor-analytic approach. On re-examination of the correlations, however, it was decided that the approach taken by Marge, i.e., interpretation of the correlations between antecedent variables and factor scores had been adequate and that a new factor analysis would do little more than reconfirm the relationships identified by Marge.

This planned study, therefore, was dropped.

Study X

Relations between Personality and Written Composition Style

This study was planned as a sequel to Study III. Rather than using literary productions of professional writers to identify style factors, we planned to rate style factors from high school students' compositions, and at the same time study the relation of these factors to scores on personality tests and other data.

Method

Sample. The Ss were boys and girls in the 10th, 11th, and 12th grades of the senior high school of a semi-rural suburb (Lynnfield, Mass.) in the Boston metropolitan area. All students in these grades were tested, but some cases had to be eliminated because of incomplete data for various reasons--absence on one testing day, failure to finish one or more of the tests, etc. The data presented here are based on N's ranging from 100 to 156 for the boys, and 96 to 145 for the girls.

Measures. The measures may be considered under three categories: personality tests, self-ratings of personality, and theme ratings.

1. Personality tests. Two personality tests were given, the Minnesota Counseling Inventory (MCI) and the Guilford-Zimmerman Temperament Survey (GZTS). Scores for each S on 18 personality scales were thus obtained--eight from the MCI and 10 from the GZTS. Raw scores were used in the analysis, as the GZTS standard scores are grouped in five-point intervals and consequently the criterion of continuity could not be met for the subsequent correlational analysis. Because the same raw score may indicate the presence of different degrees of a particular characteristic for the two groups, the analyses were done separately for boys and girls.

2. Self-ratings. The Ss were asked to rate themselves on 21 bipolar seven-point scales in semantic differential format, as follows:

1. excitable - calm
2. messy - neat
*3. subtle - obvious
*4. serious - humorous
*5. earnest - flippant
*6. rational - emotional
7. immature - mature
8. insensitive - sensitive
9. tense - relaxed
*10. affected - natural
*11. interesting - boring
12. sincere - insincere
*13. complex - simple

14. sociable - unsociable
*15. unpleasant - pleasant
16. careful - careless
*17. disorderly - orderly
*18. wordy - not wordy
*19. personal - impersonal
20. competitive - cooperative
21. follower - leader

The scales indicated with an asterisk (*) were identical to scales also used in the theme ratings (to be discussed below), except that the theme rating scale corresponding to No. 18, "wordy - not wordy" was "wordy - succinct." The directions to the Ss were as follows:

> "The purpose of this test is to determine what you think about yourself. On the following page you will find the word 'me' and below it a set of scales. You are asked to rate yourself on each of these scales in exactly the same way that you rated the voices you heard earlier [this has reference to Study II, which also used these subjects].
>
> "Your answers are confidential and, as all materials are coded by number as soon as they are received, nobody will be able to see how you rated yourself. If there are any scales on which you strongly object to rating yourself, skip them. Remember this material is for research purposes and the value of this study depends upon your answering as accurately and honestly as possible."

3. Theme ratings. In preparation for the obtaining of these measures, a TAT-type photograph was made especially for this project (Figure 1). Copies of this photograph were offset-printed and included in the Ss' test-booklets. Ss were asked to write a story for which the picture could be used as an illustration. The instructions were as follows:

> "In this part of the experiment, you are asked to use your imagination in creating a story. On the following page you will find a picture. We want you to write a story such that this picture could be used as an illustration for it. Tear the picture out of the booklet so that you can refer to it as you write. (Turn the picture in with your booklet at the end of the experimental session.)
>
> "DO NOT MERELY DESCRIBE THE PICTURE. Try to invent an interesting story about it. The way you write the story is completely up to you. However, we suggest that you try to include what had led up to the situation, what is happening now, and what the outcome will be. Do your very best.
>
> "Write your story on the ruled paper provided, and if possible use only one side of each sheet. However, if you run out of paper, use the back of the pages you've already written on."

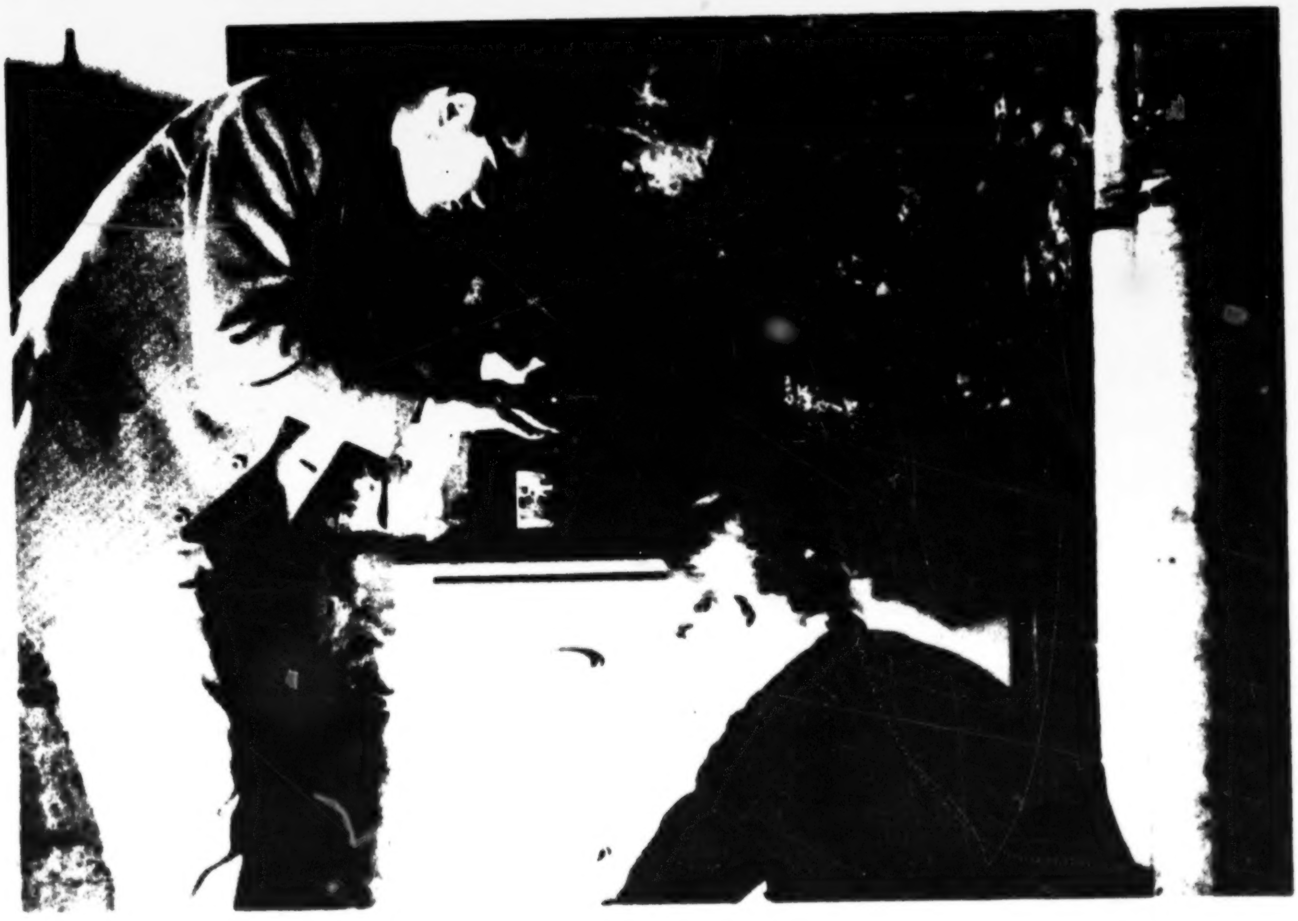

Fig. 1. Photograph used as stimulus for students' free compositions.

In giving the Ss the task of writing an imaginative story, it was hoped that they would exhibit personal characteristics in their handling of the story in a way that might not occur if their task involved simple exposition or argumentation.

The resulting stories were inspected and a few which were not of sufficient length to make ratings possible were discarded. The remaining stories were then rated by four raters on 27 scales. Six of the scales were designed to be ratings of the content of the passage, while 18 were designed to be ratings of the "style" of the passage. Twenty of the scales were chosen from those used in a study of dimensions of prose style in a sample of 150 passages of English prose (see Study III). From each of five factors identified in that study, the four scales having the highest loadings on the factor were chosen. A sixth factor, Characterizing-Narration, yielded no loadings greater than .17 on any rating scales in the previous study and was therefore not considered here. Table 1 presents the scales used in this study and the key loadings that had been obtained on the five factors of style in the previous study. The aim was to obtain evaluations of the Ss' stories on the several dimensions found to be descriptive of prose style.

Table 2 presents the complete set of theme-rating scales used in the present study, in the form in which they were presented to the raters. As may be noted, the semantic differential format was utilized. Scale A, at the head of the form, was included as a check on the extent to which the Ss followed directions, but results from this scale were not included in the correlational analysis. Scales 25 and 26 were included for the purposes of another study for which the same students were being used as subjects. Four additional scales that were not derived from the previous study (scales 1, 3, 15, and 21) were included to get at postulated dimensions not covered or not fully covered by the other scales. For example, scale 15, orderly-disorderly, was added to the list to provide a measure of compulsivity.

The four raters, who were teachers or college graduates with advanced work in English, were given written instructions similar to those used in the previous study of literary style (Study III). It was emphasized to them, however, that since they were not rating the work of professional writers, they should interpret their standards in such a way as to use the full range of ratings on each scale with respect to this particular set of stories. Each rater met with the experimenter, rated one story, and discussed the scales and the method of making ratings. The final score on each scale for each subject was the total of all four ratings. For a small number of stories that were rated by only three raters, the scores were prorated to estimate what the score would have been with four ratings. (No study of the reliability of these ratings has been made, but the communalities of the final ratings in the factor analysis provide lower-bound estimates for their reliabilities.)

Procedure. All data were gathered in two testing sessions, separated by a period of a few months. The two personality tests were given in the first session, which was of about two hours' length. A number of Ss could

Table 1

Key Loadings of Twenty Theme Rating Scales on Factors of Prose Style in Study III

Scale	Factor				
	General Stylistic Evaluation A	Personal Affect B	Ornamentation C	Abstractness D	Seriousness E
good--bad	.95				
pleasant--unpleasant	.88				
strong--weak	.88				
interesting--boring	.84				
personal--impersonal		.83			
intimate--remote		.82			
emotional--rational		.77			
vigorous--placid		.63			
florid--plain			.66		
succinct--wordy			-.65		
lush--austere			.55		
natural--affected			-.51		
subtle--obvious				.72	
abstract--concrete				.64	
complex--simple				.51	
profound--superficial				.41	
earnest--flippant					.71
serious--humorous					.70
masculine--feminine					.58
meaningful--meaningless					.41

Table 2

Rating Sheet for Style Samples

Style Sample
___
___
Rater
___
___

A. Type of Passage
Picture Description ___:___:___:___:___:___:___ story

CONTENT ratings: Characterize the content or subject matter of the passage.

1 morbid ___:___:___:___:___:___:___ gay
2 abstract ___:___:___:___:___:___:___ concrete
3 happy ___:___:___:___:___:___:___ sad
4 subtle ___:___:___:___:___:___:___ obvious
5 superficial ___:___:___:___:___:___:___ profound
6 meaningful ___:___:___:___:___:___:___ meaningless

STYLE ratings: Characterize the "style" of the passage.

7 wordy ___:___:___:___:___:___:___ succinct
8 simple ___:___:___:___:___:___:___ complex
9 boring ___:___:___:___:___:___:___ interesting
10 flippant ___:___:___:___:___:___:___ earnest
11 remote ___:___:___:___:___:___:___ intimate
12 vigorous ___:___:___:___:___:___:___ placid
13 plain ___:___:___:___:___:___:___ florid
14 weak ___:___:___:___:___:___:___ strong
15 orderly ___:___:___:___:___:___:___ disorderly
16 humorous ___:___:___:___:___:___:___ serious
17 pleasant ___:___:___:___:___:___:___ unpleasant
18 austere ___:___:___:___:___:___:___ lush
19 affected ___:___:___:___:___:___:___ natural
20 good ___:___:___:___:___:___:___ bad
21 optimistic ___:___:___:___:___:___:___ pessimistic
22 impersonal ___:___:___:___:___:___:___ personal
23 rational ___:___:___:___:___:___:___ emotional
24 feminine ___:___:___:___:___:___:___ masculine

---

25 AUTHOR
evaluates ___:___:___:___:___:___:___ is indifferent

26 CHARACTERS IN STORY
evaluate ___:___:___:___:___:___:___ are indifferent

not finish them in the time allowed, and were called from study halls to complete them a few days later. During the second testing period, Ss first wrote their stories, and then completed the self-ratings. (They also performed some tasks for another study.) The Ss were in their homerooms for the experiment; instructions for the testing were read over the school's public address system. The long period between the administration of the personality tests and the collecting of themes and self-ratings probably insured a greater degree of experimental independence between the measures; students were at no time told that the study concerned relationships between the personality measures and the performance on written composition.

Method of Analysis. Separate correlational and factor analyses were made for boys and for girls. Each correlation matrix had 68 variables: 26 theme-ratings, 21 self-ratings, 10 scales from the GZTS and 8 scales from the MCI. No transformations of variables were made; ordinary Pearsonian product-moment correlations were computed by a "missing data" routine that permitted each correlation to be based on the number of cases available for that correlation. (Because of the large number of correlations involved, no investigation of possible curvilinearity of regression was made.) Factor analysis was accomplished by the principal components method using initial estimates of communalities based on the highest absolute value of a correlation in each array; varimax rotations were performed on the characteristic vectors having latent roots greater than unity.

Results

The correlation and factor matrices resulting from these analyses are on file. Only the major results will be summarized here.

In the case of both the boys' and girls' matrices, 12 vectors had latent roots greater than one. All rotated factors were "interpretable"; it is possible, therefore, that more factors could have been rotated.

Table 3 shows the mean, S.D., and communality for each variable for boys and the communalities only for girls. Unfortunately, the means and S.D.'s for the girls are not available at this writing, the relevant data sheets having been lost.

As noted earlier, the communalities provide a lower-bound estimate of the reliabilities. For the boys, communalities of theme-ratings range from .336 to .959, with a median at .802; for the girls, they range from .473 to .930 with a median of .805. There is a suggestion in the data that the communality is partly a function of the amount of variance. But a more interesting finding is that among the variables that have highest communalities (hence, probably, highest reliabilities) are the scales having to do with the evaluative dimension--good-bad, weak-strong, pleasant-unpleasant, and boring-interesting. This contrasts with the finding of Study III, in which it was reported that ratings of the Evaluative dimension had relatively low reliabilities. In that study, however, the variances of ratings on the Evaluative dimension were probably relatively low, possibly because most of the passages rated were published writings by professional writers.

Table 3

Means, S.D.'s, and Communalities for Variables in Study X

Variable No.	Description	Boys			Girls
		Mean	S.D.	h^2	h^2
	Theme-Ratings[1]				
1	morbid--gay	13.72	4.66	.855	.868
2	abstract--concrete	20.61	3.70	.455	.633
3	happy--sad	16.47	4.07	.879	.885
4	subtle--obvious	18.79	3.54	.593	.728
5	superficial--profound	11.60	3.08	.644	.701
6	meaningful--meaningless	13.33	3.62	.635	.647
7	wordy--succinct	16.44	3.99	.512	.603
8	simple--complex	13.68	4.68	.769	.807
9	boring--interesting	17.58	4.85	.937	.878
10	flippant--earnest	18.85	5.96	.886	.847
11	remote--intimate	15.10	5.09	.918	.868
12	vigorous--placid	13.79	4.87	.825	.718
13	plain--florid	13.39	4.30	.843	.896
14	weak--strong	16.67	5.66	.959	.926
15	orderly--disorderly	13.63	4.68	.799	.707
16	humorous--serious	19.55	5.11	.891	.832
17	pleasant--unpleasant	15.76	4.49	.907	.896
18	austere--lush	14.65	2.82	.786	.828
19	affected--natural	19.09	3.64	.682	.692
20	good--bad	15.04	5.34	.958	.930
21	optimistic--pessimistic	15.42	4.02	.805	.803
22	impersonal--personal	14.54	5.45	.903	.871
23	rational--emotional	14.08	3.72	.476	.473
24	feminine--masculine	18.78	3.47	.336	.478
25	author: evaluates--is indifferent	14.78	4.97	.621	.601
26	characters: evaluate--are indifferent	10.89	6.10	.624	.599
	Self-Ratings: "Me"[2]				
27	excitable--calm	3.77	1.72	.419	.549
28	messy--neat	4.97	1.54	.510	.603
29	subtle--obvious	4.01	1.33	.236	.691
30	humorous--serious	3.08	1.49	.155	.817
31	earnest--flippant	3.36	1.49	.433	.602
32	rational--emotional	3.97	1.45	.441	.631
33	immature--mature	5.36	1.13	.378	.612
34	insensitive--sensitive	4.75	1.49	.375	.285
35	tense--relaxed	4.48	1.67	.471	.532
36	affected--natural	5.11	1.49	.349	.245
37	interesting--boring	3.39	1.18	.478	.252
38	sincere--insincere	2.65	1.11	.426	.501
39	complex--simple	3.32	1.26	.177	.849

Table 3 (continued)

Variable No.	Description	Boys			Girls
		Mean	S.D.	h^2	h^2
40	sociable--unsociable	2.60	1.36	.531	.733
41	unpleasant--pleasant	5.34	1.05	.574	.592
42	careful--careless	3.24	1.56	.501	.668
43	disorderly--orderly	4.92	1.52	.376	.718
44	wordy--not wordy	4.20	1.66	.326	.693
45	personal--impersonal	3.49	1.31	.265	.391
46	competitive--cooperative	3.90	1.73	.165	.578
47	follower--leader	4.92	1.29	.475	.151
	Guilford-Zimmerman Temperament Survey (raw scores)				
48	General Activity	15.96	5.43	.398	.385
49	Restraint	12.50	4.62	.604	.445
50	Ascendance	15.04	5.12	.637	.350
51	Sociability	17.16	6.28	.745	.362
52	Emotional Stability	16.25	4.80	.522	.370
53	Objectivity	15.23	5.39	.629	.487
54	Friendliness	11.56	4.91	.515	.310
55	Thoughtfulness	16.10	5.57	.464	.497
56	Personal Relations	14.80	5.23	.452	.305
57	Femininity	19.00	3.60	.312	.361
	Minnesota Counseling Inventory (raw scores)				
58	Validity	3.51	2.09	.289	.675
59	Family Relationships	10.37	7.19	.571	.419
60	Social Relationships	20.70	11.07	.757	.558
61	Emotional Stability	13.06	6.38	.724	.613
62	Conformity	13.63	4.28	.601	.313
63	Adjustment to Reality	12.61	7.34	.737	.153
64	Mood	11.99	4.26	.688	.295
65	Leadership	12.23	5.17	.690	.431

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[1] Mean Ratings on a scale from 4 to 28 with a logical midpoint at 16; 4 corresponds to maximum degree for left end of scale (e.g., maximum morbidity for scale 1), 28 to maximum degree for right-hand end of scale.

[2] Mean Ratings on a scale from 1 to 7 with a logical midpoint at 4; interpretation similar to that for theme-ratings.

In the present study, it is noteworthy that apparently reliable style ratings were obtained for many of the scales presumably measuring style factors other than Evaluation. Two or more of the scales for the factors Personal Affect, Ornamentation, Abstractness, and Seriousness had communalities above the median. From this evidence, it may be concluded that themes obtained from high school students can be reliably rated on style factors.

From the mean theme ratings (on a scale running from 4 to 28 with a midpoint at 16) it may be seen that most of the mean ratings tended to cluster around the midpoint. The only ratings that fell outside the zone corresponding to the midpoint ± one point on the original 7-point scale were those for abstract--concrete (the themes were quite concrete) and superficial--profound (they tended to be rated as superficial). (As noted above, no data are available for the girls.)

The communalities of self-ratings were generally lower than those for the theme ratings. This is to be expected from the fact that they were single ratings rather than values pooled from the judgments of several raters. For the boys, the communalities ranged from .155 to .574 with a median at .419; the girls' communalities ranged somewhat higher, from .151 to .849 with a median at .602. The rankings of the variables with respect to communality were quite different; for example, the scale complex-simple had the highest communality for the girls but one of the lowest for the boys.

As might be expected, the mean self-ratings for the boys tended to lie toward the favorable ends of the scales; there was sufficient variance, however, to permit meaningful intercorrelations.

The communalities of the personality scales were of substantial magnitude, permitting the inference that the scales were sufficiently reliable to provide useful assessments.

Factor Analytic Results. In the main, the factor patterns for the boys' and the girls' matrices were similar, although there were a number of dissimilarities. The major finding that was pertinent to the objective of this study was that there were few, if any, substantial relations between style ratings of the written compositions and any of the personality measures. The factors obtained stemmed either from the theme ratings or from the personality measures (personality inventories or self-ratings) but not from both. Indeed, there were few relationships between any of the personality inventory scores and the self-ratings.

For purposes of exposition, we will organize the factor-analytic results according to the sources of the factors, taking up first the factors derived principally from the theme ratings.

Six of the 12 factors from the two matrices (i.e., the boys' and the girls') were factors that were found in both matrices and that could be identified as deriving almost exclusively from the theme ratings. We will list the variables identifying each of these factors and display the loadings equal or greater than .30 in at least one of the matrices. When bipolar scales are mentioned, it is to be understood that the loading applies to the first-mentioned or left-hand end of the scale. (Some scales and factors have been reflected through the origin to facilitate interpretation.)

Themes: Evaluation

Variable	Loadings	
	Boys	Girls
*strong-weak	.95	.94
*good-bad	.95	.93
*interesting-boring	.92	.91
*pleasant-unpleasant	.87	.84
orderly-disorderly	.79	.67
vigorous-placid	.69	.70
meaningful-meaningless	.68	.52
profound-superficial	.58	.55
complex-simple	.52	.60
characters evaluate	.43	.48
subtle-obvious	.35	.37
florid-plain	.30	.37
intimate-remote	.26	.44
wordy-succinct	-.40	-.28
personal-impersonal	(.19)	.34

The scales marked with an asterisk were those chosen from the previous study to represent the Evaluation factor, and it is noteworthy that in both matrices they had the highest loadings on this factor. These can be relied on to produce measures of the Evaluation factor.

Theme: Ornamentation vs Plainness

*lush-austere	.84	.87
*florid-plain	.83	.86
*affected-natural	.74	.77
complex-simple	.64	.63
subtle-obvious	.64	(.22)
abstract-concrete	.58	(.28)
*wordy-succinct	.47	.69
emotional-rational	.44	.46
profound-superficial	.38	(.09)

The scales marked with an asterisk were the reference scales, and had high loadings only on the Ornamentation factor.

Theme: Humor vs Seriousness

*flippant-earnest	.87	.88
*humorous-serious	.87	.84
vigorous-placid	.35	.28
*masculine-feminine	-.31	-.37
*meaningful-meaningless	(-.27)	-.51

Of the scales selected from the previous study, only the first two had high loadings; the other two are apparently not highly valid measures of this factor.

Theme: Personal Affect

*personal-impersonal	.89	.84
*intimate-remote	.87	.80
*emotional-rational	.41	(.25)
masculine-feminine	(-.03)	.30

The scale, vigorous-placid, included to help identify this factor, did not appear on the factor in this study.

Theme: Abstractness-Concreteness (found only in girls' matrix)

*abstract-concrete		.70
*subtle-obvious		.66
*profound-superficial		.48
emotional-rational		.25

Contrary to expectation from the previous study, the scale complex-simple did not appear on the factor. The failure to find the Abstractness-Concreteness factor in the boys' matrix may have been due either to lack of sufficient variance on the relevant scales among the boys' themes, or to a failure to use a sufficient number of factors in the rotations.

Theme: Optimism

happy-sad	.92	.92
gay-morbid	.89	.91
optimistic-pessimistic	.87	.86
pleasant-unpleasant	.33	.34
vigorous-placid	-.30	(-.25)
masculine-feminine	(-.22)	.32

This was a factor that had not appeared in the previous study but was defined mostly by scales that were introduced in this study for the first time.

Theme: (Doublet for author vs. character evaluation)

Author evaluates--is indifferent	.74	.70
Characters evaluate--are indifferent	-.60	-.48
Me: Follower-Leader	(.08)	-.32

This is labeled a doublet because it apparently represents simply a dimension created by the fact that the raters were asked to indicate whether any "evaluations" made were made by the author or by the characters of the story. Nevertheless, this factor was the only one of the theme factors that exhibited any significant loadings on any of the self-ratings. It would appear that students (girls, at least) who rate themselves as "leaders" tend to write stories in which they themselves make value judgments, rather than letting their characters do so. Nevertheless, this tendency is very slight and its significance would have to be confirmed in a replication study.

We next take up the factors identified as derived primarily from the self-ratings. Because of missing data in the girls' matrix and difficulties with computational routines, the available data for girls do not appear to be correct and therefore the results for girls will not be presented.

Self-Ratings: Boys: Disorganization?

careless-careful	.66
messy-neat	.61
flippant-earnest	.58
disorderly-orderly	.50
insincere-sincere	.48
immature-mature	.44
follower-leader	.43
GZTS: Restraint	.36

Self-Ratings: Boys: Self Perceived as Rational, Calm

rational-emotional	.61
calm-excitable	.61
relaxed-tense	.54
insensitive-sensitive	.35
subtle-obvious	.31
GZTS: Femininity	.41
MCI: Emotional Stability	-.32
GZTS: Emotional Stability	-.30
MCI: Mood	-.30

Self-Ratings: Boys: Pleasant Sociability

pleasant-unpleasant	.66
sociable-unsociable	.64
interesting-boring	.57
personal-impersonal	.37
leader-follower	.30

Factors primarily derived from personality test scores are next given, but only for the boys' matrices since the available girls' matrices are very probably in error.

Personality Tests: Boys: Ascendant Sociability

MCI: Social Relationships	.80
GZTS: Sociability	.79
MCI: Leadership	.71
GZTS: Ascendance	.71

MCI: Mood	.67
GZTS: General Activity	.50
MCI: Emotional Stability	.35
MCI: Adjustment to Reality	.28
Self-rating: follower-leader	.34
Self-rating: sociable-unsociable	-.32

It is noteworthy that the self-ratings of leadership and sociability are somewhat negatively correlated with corresponding scores on the personality tests. There were no significant loadings of this factor on theme-ratings.

Personality Tests: Boys: Good Adjustment

MCI: Conformity	.74
MCI: Adjustment to Reality	.71
GZTS: Objectivity	.69
MCI: Family Relationships	.68
GZTS: Friendliness	.63
MCI: Emotional Stability	.61
GZTS: Emotional Stability	.55
GZTS: Personal Relations	.50
MCI: Validity	.34
GZTS: Restraint	.33

Personality Tests: Boys: Thoughtfulness and Restraint

GZTS: Thoughtfulness	.65
GZTS: Restraint	.52
MCI: Validity	-.33
GZTS: Personal Relations	.31
Self-rating: insensitive-sensitive	.38
Theme-rating: masculine-feminine	.33

The loading of this factor on the masculine-feminine theme-rating is one of the few cases in which there was any relationship exhibited between personality test scores and theme-ratings. It suggests that boys who score as thoughtful and restrained tend to write themes which give the impression of "masculinity." The actual correlations underlying these findings are .270 (masculinity-femininity and GZTS Restraint; $N = 135$, $p < .01$) and .209 (masculinity-femininity and GZTS Thoughtfulness; $N = 135$; $p < .05$).

Discussion and Conclusions

One major result of the study is the finding that high-school students' written themes can be reliably rated on a number of "style" factors: Evaluation, Ornamentation, Humor, Personal Affect, Abstractness, and Optimism. Most of these style factors had already been identified in the literary productions of professional writers. Possibly still other "literary style" factors could be identified, either in high-school students' themes or in other kinds of literary productions, by the use of appropriate rating scales.

The other major result of the study is the finding that at least in the case of a particular theme-writing task (writing an imaginative narrative in response to a picture), there were few if any significant relations between rated style factors and a series of fairly comprehensive personality tests and self-ratings. Since this was simply an exploratory study, there was no prior theory that there would be any such relationships; it was simply desired to determine whether such relationships would be readily apparent in an exploratory study.

Since the relationships did not appear to be significant (with a couple of minor exceptions), the following hypotheses are suggested for further investigation:

(1) Rated style factors are specific to particular kinds of writing tasks and would not have generality over the total writing output of an individual.

(2) Even if certain style factors could be found to have limited generality over certain types of writing output, they would not be found to have relations with personality variables.

(3) The relationships between style and personality did not emerge as significant in this study because the measures of personality were not sufficiently accurate or valid.

Study XI

Study of Judgments of Children's Personality from Voice Recordings

This study was planned to examine relations between rated characteristics of children's recorded voices to attributed personality characteristics, using data collected in the course of Study VII. Time did not permit the completion of this study.

Study XII

The memoranda on the planning of this study are vague; one speaks of a study of "certain speech characteristics of adults," while another speaks of "a study of certain data on parent attitudes toward speech." In any event, the study was never done because of lack of time and funds.

Study XIII

(Because of an error of numbering, there was no Study XIII.)

Study XIV

Review of the Literature of Speech and Personality

This was to be an extended document reviewing the literature of speech and personality. Although much work was done in assembling and abstracting bibliographical material, this review was never written. The materials are still in the principal investigator's possession and it is hoped that they can eventually be shaped into the desired document.

However, a bibliography that had been assembled prior to the undertaking of the project is placed in Appendix C for its possible usefulness.

Study XV

Verbal Style of Conceptualization and Personality Characteristics

This study was done by Aaron S. Carton for his doctoral dissertation at the Harvard Graduate School of Education (1961). It was done within the same context as Study X and utilized some of the data obtained in that study.

This study is regarded as complete. Dr. Carton's summary is included here.

Summary

Experimentation and research has heretofore concerned itself with the relations between speech and personality, or between conceptualization and personality, or between language and thought. This thesis is seen as an exploratory contribution to the study of language and thought which approaches the problem by studying the relations between two pairs of the related phenomena; verbal style and personality is one pair, and conceptualization and personality is the second pair. The thesis sought to contribute

(a) a specific taxonomy of verbal styles of conceptualization;

(b) a specific demonstration of variations due to stimulus conditions and stimulus objects, and

(c) some specific relationships between personality characteristics and our taxonomy of verbal styles of conceptualization.

Several descriptions of pictures which were supplied by each member of a population of 18 college students and a different population of 81 high school students constituted the main source of data used. Paintings by famous artists were used as stimulus objects. The pictures varied in style and content, although they were all depictions of relatively large groups of people. Several variations in instructions to Ss were employed.

Rating procedures by judges were developed in successive steps and 10 scales describing the products, quality, or processes of conceptualization observed in the picture descriptions were formulated. Scores on these scales were correlated with scores made by the high school students on

(a) 10 scales of the Guilford-Zimmerman Temperament Survey (G-Z Temperament Survey);

(b) 8 scales of the Minnesota Counseling Inventory (MCI);

(c) 27 rating scales of short stories written by the students, and

(d) 21 self-rating scales on an instrument called "Me."

Each scale was studied for (a) its inter-judge reliability, (b) the consistency of Ss scores in respect to several ratings on the scale, (c) its variations due to variations in the stimulus conditions and to variations in the stimulus objects, (d) its correlations with the other scales.

Each of the 10 scales utilized in the final study is described briefly below. This list retains the number designations of the scales used in a pilot study which contained 11 scales.

Scale 1, alteristic-egoistic, was essentially a measure of the speaker's personal involvement in describing a stimulus.

Scale 2, amount of manifestation of awareness of own cognitive processes, was concerned with measuring how conscious a speaker is of the cognitive processes in which he engages.

Scale 3, amount of evaluation, was a measure of the relative number of evaluative adjectives and expressions of affect which appeared in a description.

Scale 4, degree of organization of percepts, was a measure of the extent to which the speaker would integrate features of the stimulus field and produce relational concepts.

Scale 5a, progression of organization, analytic, measured the direction of integrations. Scale 5a was concerned with the extent to which speakers started with organized concepts and analyzed them into components.

Scale 6, degree and amount of inference, was a measure of the extent to which a speaker would depart from a literal description of the sense data presented to him and make inferences as to events depicted or concepts to be formed.

Scale 7, plain-ornamented, was an adaptation of a factor of literary style pertaining to the amount of embellishment a speaker tends to employ.

Scale 8, amount of digression, was a measure of the tendency of a speaker to depart from a description of the stimulus object.

Scale 9, amount of fictionalization, was a measure of the tendency of speakers to fabricate events and relationships on the basis of the stimulus field.

Scale 10, specific-general, was intended to obtain an indication of the extent to which a speaker concerns himself with details and the extent to which he concerns himself with more general or gross aspects of the stimulus field.

In the final study the inter-judge reliabilities of the scales for 5 judges (computed by Ebel's method) ranged from .14 to .65. The average reliabilities, or expected test-retest correlations using an "equivalent" set of judges, ranged from .46 to .90. The correlations between pairs of protocols for each scale ranged from .09 to .50.

In one pilot study, 10 picture descriptions obtained by three slightly different experimental techniques were studied in respect to 10 high school students. Two-way analyses of variance for each scale in which Ss and picture descriptions were the variables, revealed that the instructions and/or the stimulus objects were a significant source of variation for almost all the scales. Findings throughout the thesis point to the fact that the length of the protocol is a significant factor in the amount of any trait the judges perceive, despite the fact that the measures were intended to be relative to the population studied.

Rather large intercorrelations among the scales were observed with a high degree of consistency throughout the study. These correlations were to an extent "built in" to the definitions of the scales. It was pointed out, however, in the theoretical sections of the thesis that where relatively large, complicated, and exhaustive taxonomies are used, and in experimental procedures in which Ss were relatively free to choose their concepts from a large universe and are unrestricted as to the conceptual processes used, intercorrelations among the concept categories are bound to occur.

Some low, but statistically significant, correlations were found with the independent measures. Several of these correlations suggested that some of the traits measured by the scales formulated for this thesis were consistently related to similar traits in the written production of the Ss. Other correlations implied the existence of pervasive personality configurations although considerable further research is required to verify the relationships suggested. Scale 4 (amount of organization), for example, was related to "masculinity" on the "G-Z Temperament Survey," negatively related to "leadership" on the MCI. On the self-rating form "Me" it was positively related to "messy-neat," "immature-mature," "disorderly-orderly," and "follower-leader." It was negatively related to "careful-careless," and "competitive-cooperative." The configuration of correlations suggested that individuals manifesting "organization" in their picture descriptions regarded themselves as people who intend to organize matters and keep things neat. The fact that the stimulus objects contained representations of people is believed to have elicited the relation of the scale with a perception of one's self as a leader, although this self-perception is negatively related to the leadership scale on the MCI.

The fact that protocols of verbal behavior were used pointed to the importance of distinguishing between the processes of assigning exemplars to concepts and the attainment and formation of concepts and pointed to the necessity of distinguishing between the processes of conceptualization and the products of the process. The implications for education were seen to be partially in the diagnostic value of the identification of conceptual styles for teaching various kinds of subject matter, in the possibility of developing techniques for modifying and improving desired conceptual styles, and in the value to teachers of training in identifying conceptual styles. The problems for future research were seen as being primarily the establishment of better objective techniques of measuring the traits, explorations of variations of the traits in the presence of experimental manipulations and the development of a measurement procedure to study the relative consistency of a given trait in respect to a single _S_. The ultimate validation of the scales as measures of relevant dimensions of style is expected to occur in concept attainment and concept formation experiments and by relating the scales to proficiency in the intellectual pursuits which are believed to involve the traits.

References

Anastasi, Anne (Ed.) Testing problems in perspective. Washington, D. C.: American Council on Education, 1966.

Carroll, J. B. Biquartimin criterion for rotation to oblique simple structure in factor analysis. Science, 1957, 126, 1114-1115.

Carroll, J. B. Computer applications in the investigation of models in educational research. In A. G. Oettinger (Ed.), Proceedings of a Harvard symposium on digital computers and their applications, 3-6 April 1961. Cambridge: Harvard University Press, 1962. Pp. 48-58. (Annals of the Computation Laboratory of Harvard University, XXXI.)

Carroll, J. B., & Austin, Mary C. Underachievement in reading: a study of its extent and causes in the public schools of Newton, Mass. Cambridge: Laboratory for Research in Instruction, Graduate School of Education, Harvard University, 1957.

Cochran, W. G., & Cox, Gertrude N. Experimental designs. New York: Wiley, 1959.

Diederich, P. B., French, J. W., & Carlton, Sydell T. Factors in judgments of writing ability. Research Bulletin 61-15. Princeton, N. J.: Educational Testing Service, 1961.

Harris, C. W. An exploration of language skill patterns. Journal of Educational Psychology, 1948, 39, 321-336.

Holzinger, K. J., & Harman, H. H. Factor analysis: a synthesis of factorial methods. Chicago: University of Chicago Press, 1941.

Jenkins, J. J. (Ed.) Associative processes in verbal behavior: A report of the Minnesota conference. (Mimeo.) University of Minnesota, Minneapolis, 1959.

Jenkins, J. J. Commonality of association as an indicator of more general patterns of verbal behavior. In T. A. Sebeok (Ed.), Style in language. New York: Wiley, 1960. Pp. 307-330.

Kjeldergaard, P. J. Commonality scores under instructions to give opposites. Psychological Reports, 1962, 11, 219-220.

Lorge, I. Estimating structure in prose. In J. B. Carroll (Ed.), Proceedings of the 1960 Invitational Conference on Testing Problems. Princeton, N. J.: Educational Testing Service, 1961. Pp. 111-122.

Roberts, P. Patterns of English. Teachers Edition. New York: Harcourt, Brace, and World, 1956.

Russell, W. A., & Jenkins, J. J. The complete Minnesota norms for responses to 100 words from the Kent-Rosanoff word association test. Minneapolis, Minn.: Department of Psychology, University of Minnesota, 1954.

Sanford, F. Speech and personality. Psychological Bulletin, 1942, 39, 811-845.

Taylor, C. W., Smith, W. R., Ghiselin, B., Sheets, B. V., & Cochran, J. R. Identification of communication abilities in military situations. USAF WADC Technical Report, 1958, No. 58-92.

Thurstone, L. L. Primary mental abilities. Chicago: University of Chicago Press, 1938. (Psychometric Monographs, No. 1).

PUBLICATIONS RESULTING FROM THIS PROJECT

Carroll, John B. Biquartimin criterion for rotation to oblique simple structure in factor analysis. Science, 1957, 126, 1114-1115.

Carroll, John B. A sub-sub-treasury of literary style: 150 300-word passages from a variety of authors and sources. Cambridge: Graduate School of Education, Harvard University, 1958.

Carroll, John B. Vectors of prose style. In T. A. Sebeok (Ed.), Style in language. Cambridge: Technology Press, and New York: Wiley, 1960. Pp. 283-292.

Carroll, John B. Computer applications in the investigation of models in educational research. In A. G. Oettinger (Ed.), Proceedings of a Harvard symposium on digital computers and their applications, 3-6 April 1961. Cambridge: Harvard University Press, 1962. Pp. 48-58.

Carroll, John B., Kjeldergaard, Paul M., & Carton, Aaron S. Number of opposites versus number of primaries as a response measure in free-association tests. Journal of Verbal Learning and Verbal Behavior, 1962, 1(1), 22-30.

Carton, Aaron S. Verbal style of conceptualization and personality characteristics. Unpublished doctoral dissertation, Graduate School of Education, Harvard University, 1961.

Kjeldergaard, Paul M., & Carroll, John B. Two measures of free association response and their relations to scores on selected personality and verbal ability tests. Psychological Reports, 1963, 12, 667-670.

Marge, Michael. Home background influences on the development of oral communication skills in children. Unpublished doctoral dissertation, Graduate School of Education, Harvard University, 1959.

Marge, Michael. A factor analysis of oral communication skills in older children. Journal of Speech and Hearing Research, 1964, 7(1), 31-46.

Marge, Michael. The influence of selected home background variables on the development of oral communication skills in children. Journal of Speech and Hearing Research, 1965, 8, 291-309.

Weinfeld, Frederic D. A factor analytic approach to the measurement of differential effects of training: an evaluation of three methods of teaching English composition. Unpublished doctoral dissertation, Graduate School of Education, Harvard University, 1959.

APPENDIX A

Changes in Perceived Personality Traits as a Function of Manipulations of Vocal Characteristics[1,2]

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There is a vast literature on the ability of raters (usually untrained) to judge personality traits or physical attributes from voices. On the personality side, attempts have been made to correlate objective measures and judges' ratings on traits such as *introversion*, *intelligence*, *sociability*, *leadership*, *honesty*, (Fay & Middleton, 1940a; 1941a; 1941b; 1942; 1943b) *dominance*, (Eisenberg & Zalowitz, 1938), *sincerity* (Hildreth, 1954), *pleasantness*, *aggressiveness*, (Starkweather, 1956), *social values*, (Allport & Cantril, 1934) and *neuroticism*, (Taylor, 1954). In terms of physical characteristics, raters have been asked to judge *sex*, *age*, *height*, *weight*, (Pear, 1957), *fatigue*, *Kretschmerian body types* (Fay & Middleton, 1940b; 1940c), and *complexion* (Allport & Cantril, 1934).

In addition to the personality trait and physical attribute domains, several studies have been concerned with how well listeners could judge a speaker's *occupation* from a recording of his voice. (Pear, 1931, 1957; Fay & Middleton, 1939; Allport & Cantril, 1934.) One study measured how accurately a judge could match a speaker's voice with his *photograph* or a *handwriting* sample (Allport & Cantril, 1934).

With two exceptions, raters have had little or no success in making judgments about any of the aforementioned characteristics on the basis of the voice alone. Judges *can* decide fairly accurately on the *sex* of the speakers and make fairly good estimates of a speaker's *age* on the basis of a sample of a person's speech. Although judgments on the remaining characteristics appear invalid, virtually all of the studies reviewed found highly consistent ratings among the judges on all traits or attributes. That is, judges agreed with one another that a given speaker had a certain trait or attribute whether or not he did in fact have such a characteristic. This interjudge agreement seems not to hold for all voices rated, but seems to be true for a certain subset of voices in each study. However, considering the diversity of judges, of speakers, of the number of characteristics rated, and of variations in experimental procedures and conditions in the studies cited, one is compelled to look upon this finding as a "universal". This phenomenon, which seems to be tangential to the studies reviewed and appears never to have been subjected to systematic investigation itself, provides the stimulus for the present sutdy. It was felt that if these "verbal stereotypes" could be systematically manipulated in some way, perhaps this would provide some insight into how these stereotypes were formed and perhaps would reflect on attitude formation in general.

Assuming that the "stereotypes" are somehow correlated with the vocal characteristics of the speakers, an obvious approach to the problem was to vary systematically the vocal characteristics of the speaker and note the corresponding changes in the verbal stereotypes. The possibilities here are legion. To mention only a few, one could with any measurable vocal characteristic select individuals who had specified amounts of a given characteristic and look for changes in stereotypes as the amount of the characteristic increased or decreased; one could draw a "sample" of speakers, do a microlinguistic analysis of their vocal characteristics, obtain ratings of various traits, and resort to a correlational analysis between the two types of measures; one could manipulate certain vocal characteristics of a voice by subjecting it to various electronic and mechanical manipulations such as those used in intelligibility studies (cf. Licklider & Miller, 1951) and thereby compare ratings of traits of the "normal" voice with those that had been distorted in various ways. The alternative decided upon was similar in approach to the latter. With neither previous research nor relevant theory to point the direction in which to look for significant variables, it was decided to use only simple manipulations of the voice which the speaker himself would make. Preliminary experimentation with various speakers rapidly led to the conclusion that rate and loudness could be most consistently manipulated across speakers and this seemed to result in noticeable changes in the vocal characteristics of the speech samples.

Again, because of the lack of the theoretical formulation and with no empirical data other than the studies cited indicating that there might be an effect to be measured, no specific hypotheses were put forth. One could formulate specific hypotheses on a "common sense" basis, e.g. an increase in rate would be accompanied by higher rating on such scales as passive-active. Such predictions, however, would add little to the study as empirical differences in either direction would prove interesting and one could probably generate post hoc explanations for almost any finding.

Method

Recordings: The stimulus material for the speech samples consisted of a 307 word passage which had been selected as being "neutral" with respect to six factors of literary style (cf. Carroll, 1960). Twenty-one male Harvard undergraduates each read the passage four times under four sets of instructions. The four conditions or instructions were "normal", "fast", "shouting", and "soft". There were no specific rules for the reader to follow under each of these conditions; however, the reader was carefully rehearsed at each stage in order to obtain a smooth reading which sounded "natural" and yet achieved the desired effect. The instructions for the "normal" condition were to read it as he would normally read it aloud to a group. For the "fast" recording the reader was instructed to increase his rate without sacrificing the impression that he was trying to communicate something to somebody. The "shout" recording was obtained by having the reader move approximately two feet away from the microphone and speak as if he were trying to project in a large auditorium.

The "soft" condition was obtained by having the reader speak within four inches of the microphone very softly (just audible) at his normal rate. Appropriate corrections were made on the preamplifier to equate the various conditions and various speakers in terms of loudness of recording. Minor adjustments with respect to intensity were also made when the original tapes were transcribed onto the test tape. It should be noted that equating the conditions of a given voice in terms of loudness was designed to make it sound as if the four conditions represented four speakers with different vocal characteristics, each reading the passage in a normal manner. Anecdotal evidence indicates that this deception was successful.

From the twenty one recorded voices three were selected by the author as having the best separation between the four conditions. In addition, two other voices were selected as being very different from these three. The "normal" condition from each of these latter two voices was included to help disguise the fact that the raters would be judging the same person several times.

Measurements: The instrument used to obtain the rating was the semantic differential (cf. Osgood, Suci, & Tannenbaum, 1957). A pilot study was conducted using sixty-two scales which seemed to be describing personality traits and which were comprehensible by high school students (raters). On the basis of the estimated reliability of the scales and a crude cluster analysis of the correlation matrix, seventeen scales were selected for inclusion in the experiment. Reliability was estimated from the intercorrelations with other scales in the matrix. No scale was included in the study which did not correlate .65 or higher with some other scale.

The polarity of the scales included in the study was randomized and then the scales were assigned to four random orders, yielding four different forms of the semantic differential. These four forms were randomly assigned to the fourteen serial positions in which the speech samples were to be presented.

APPENDIX A

This last randomization process was restricted in that the same form was not allowed to occur twice in succession. The use of four forms of the semantic differential and the restriction on the assignment of these forms to the speech samples was designed to minimize the formation of position habits by the raters and to force the raters to attend to the scales.

Stimulus material: The four conditions from the three voices plus the two single conditions from the two other voices were assigned random numbers and then these samples were transcribed onto a single tape at two and one half minute intervals in serial order according to their random numbers. Again the randomization process was restricted in that two speech samples of the same voice were not allowed to occur in succession. This precaution was taken to help disguise the fact that the same voice was being used in several of the speech samples.

Directions: The directions for the use of the rating scales were presented to the raters both visually and orally. Each judge had detailed mimeographed instructions on how to use the scales and he was asked to read these as they were read to him via the tape. The instructions were a simple adaptation of those presented by Osgood, Suci, and Tannenbaum (1957, pp. 82-84).

Subjects: The judges were senior high school students from a small suburban middle class Massachusetts public high school. The classes from each of the three grade levels were randomly assigned to the experiment and the speech samples were presented to the Ss over the school PA system.

Design: The statistical design utilized in this experiment is the split-unit design (Cochran & Cox, 1959); the classes are treated as the whole-unit or treatment variable and the speech samples are considered the sub-unit variable. Such a design takes account of the fact that sub-unit observations are correlated with each other (in this case ratings on the voices by a given judge are considered correlated) and whole-units (classes) are considered independent. This design gains precision in testing differnces between sub-units (speech samples) by sacrificing precision in testing differences between whole units (classes). It is particularly fruitful here, where one would not expect differences between classes nor would one be very interested in them if they should exist.

Results

The results of analyses of variance of the differences among voice conditions for each of the seventeen scales are summarized in Table 1. Inasmuch as Ss had been assigned to classes systematically, statistical tests of the whole-units (differences among classes) are not meaningful; therefore, that portion of the analysis of variance tables has been omitted. Certain important facts emerge from Table 1. First, for each of the seventeen scales differences in the mean

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Insert Table 1 about here

---

ratings of the speech samples exist and the magnitude of the F ratios are such that the probability that any of these are due to sampling error is extremely remote. The F ratios indicate that rather large differences exist among the speech samples rated on each of the seventeen scales. Second, only two of the seventeen interaction effects were significant (.05 level), little more than would be expected by chance. The fact that both significant interactions emerge from scales that one would expect to be highly correlated with one another (Shy-Outgoing-Insecure-Secure) lends some credence to the hypothesis that there may be some real interaction effect here, i.e., differences among the classes in the way in which they responded to speech samples. The remaining F ratios for the interaction effects are near the expected values assuming that there is no effect. Third, the mean square error terms are small and highly consistent from scale to scale indicating high interjudge agreement with respect to the ratings.

Although the analyses of variance indicate large and significant differences

APPENDIX A

Table 1

Analysis of Variance for Seventeen Semantic Differential Scales

Trait	(A) MS Speech Samples 13 df	(B) MS Speech Samples x Classes 91 df	(C) MS Error 1664 df	F (A)/(C)	F (B)/(C)
Follower-Leader	14.53	2.91	3.11	4.67***	.94
Careless-Careful	232.76	2.93	2.43	95.60***	1.20
Excitable-Calm	263.76	2.65	2.59	101.77***	1.02
Unsympathetic-Sympathetic	164.90	2.48	2.52	65.37***	.98
Submissive-Dominating	76.67	3.09	2.48	30.88***	1.24
Intolerant-Tolerant	68.51	2.77	2.91	23.51***	.95
Humble-Proud	53.22	2.75	2.28	23.37***	1.21
Shy-Outgoing	53.54	2.18	1.51	35.49***	1.44*
Messy-Neat	218.33	2.52	2.17	100.39***	1.16
Insecure-Secure	58.07	3.62	2.32	25.02***	1.56*
Dependent-Independent	45.53	3.37	2.64	17.25***	1.28
Impatient-Patient	144.48	2.13	1.87	77.15***	1.14
Unpleasant-Pleasant	146.03	2.13	2.14	68.08***	.99
Emotional-Unemotional	31.38	2.16	2.53	12.38***	.85
Cruel-Kind	128.75	2.60	2.08	61.78***	1.25
Undependable-Dependable	75.08	2.36	2.15	34.88***	1.09
Lazy-Energetic	75.40	3.08	2.78	27.09***	1.11

*p = <.05

**p = <.01

***p = <.001

among the speech samples for all of the scales, the question remains as to what accounts for these differences, whether it is differences among the different voices used or whether there are differences among the various sub-samples of the same voice. This question can be answered by turning to the mean ratings of the speech samples. As one might expect, both kinds of differences exist, i.e., there are differences among the different voices used in the recordings and there are differences, even more striking, among the sub-samples of the same voice.

Figure 1 presents graphically the relationship among the four speech conditions when averages are taken over all speech samples in the same speech condition.[3] It is quite apparent that the "normal" and "fast" conditions seem to be rated similarly and that the "shout" and "soft" ratings follow the same general pattern. Further, the "normal-fast" ratings tend to follow a pattern which is the mirror image of the "shout-soft" ratings. The "fast" ratings tend to be slightly more extreme than the "normal", and, to a lesser degree, the "soft" ratings are slightly more deviant than the "shout", so that the greatest contrast is provided, generally, between the "fast" and the "soft". It should be pointed out that the ratings of the voices, i.e., individuals, show the same patterns as the mean ratings across individuals. This can be verified by an examination of Tables A-Q.

One could perform a multitude of _t_ tests for the differences which exist among the speech samples on the various scales. The magnitudes of the relevant differences are so large and the standard errors so small and consistent from scale to scale (SE range from .15 to .21) that it is unnecessary to perform such tests in most instances. With very few exceptions the differences which exist between the "normal-fast" on the one hand and "shout-soft" on the other are significant, by the usual standards, both for individuals as well as across individuals. Although there are significant differences between these conditions

APPENDIX A

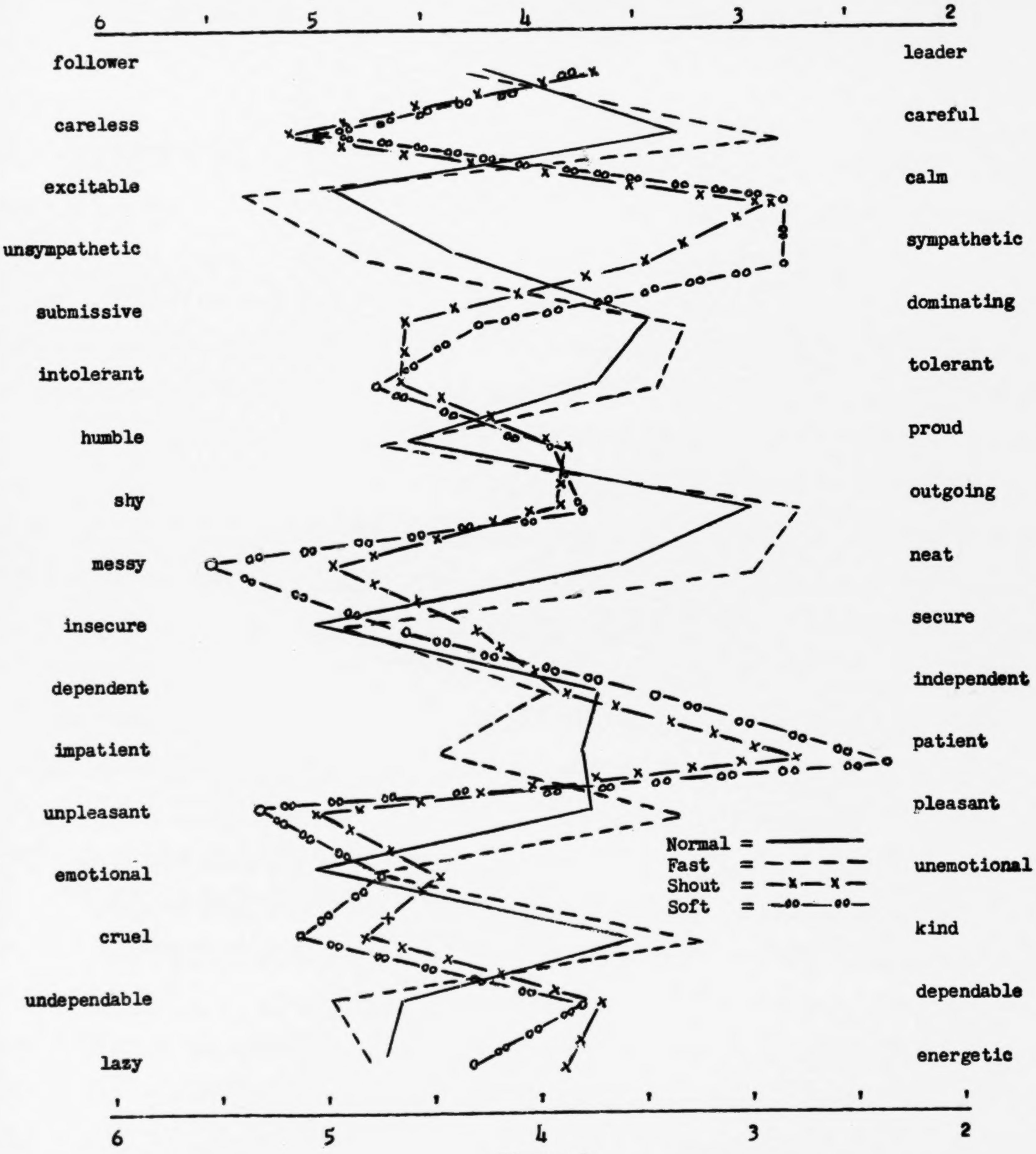

Figure 1

Mean Semantic Differential Ratings of Five Voices Recorded Under Four Speech Conditions, Normal (5 Voices), Fast, Shout, Soft (3 Voices Each).

i.e. between "normal" and "fast" and between "shout" and "soft", the magnitude of these differences is much smaller and Figure 1 can be thought of as being representative of the pattern of means for the individual voices as well as a group average. As one might expect, there are significant differences among the different voices speaking under the same condition, but on the whole, with exception of the two voice samples which were included to disguise the task, speech samples under the same conditions were rated very similarly.

Discussion

From the data presented, there can be little doubt that changes in "verbal stereotypes" can be brought about through simple (or perhaps complex) manipulation of the speech samples which Ss hear. In spite of the lack of control over the manipulation of the speech samples, similar manipulations appear to achieve the same effect across different voices. Further, the evidence (variances) indicates that there is good agreement among the judges with respect to both the basic evaluation of the rated traits and the systematic changes in ratings brought about through manipulation of the voice.

If one accepts the "normal" conditions of these voices as the "target" against which to compare the changes brought about by manipulation, then one would have to conclude that the voices selected were not neutral with respect to all of the traits being rated. Rather the "normal" voice can be characterized as excitable, emotional, insecure, undependable, outgoing, humble, and careful. The "fast" condition seems to merely accentuate the ratings made on the "normal" condition so that the ratings of the "fast" condition on the above traits are slightly more extreme on all but two traits, insecure and emotional. With the exception of the "fast" condition being perceived as being significantly more impatient, the mean ratings of the "normal" and "fast" samples are very similar on all seventeen traits.

The "shouting" and "soft" speech samples, on the other hand, can be characterized as *careless*, *messy*, *intolerant*, *cruel*, *calm*, *patient*, *sympathetic*, and *emotional*. As with the "normal" and the "fast" conditions, the mean ratings for "shout" and "soft" conditions tend to be very similar with the ratings of the "soft" samples being generally more extreme than the ratings of the "shout" samples. By and large, the first subset of conditions, "normal" and "fast", tended to produce ratings that were mirror images (about the neutral positions) of the ratings of the second subset, "shout" and "soft".

On four scales, *leader-follower*, *dependent-independent*, *secure-insecure*, *emotional-unemotional*, the resulting differences were small and, on the latter three scales, inconsistent. Only the *leader-follower* scale produced differences that were consistent from voice to voice, and in the same pattern as on the scales previously discussed. The significant *F* ratios on the latter three scales may be attributed to variation among the speech samples with no consistent pattern of ratings, in terms of manipulation, emerging.

Attempting to account for the differences between condidions which emerge in this study is very difficult inasmuch as the changes in the speech characteristics that result from the voice manipulations are complex, and it is difficult (if not impossible) to isolate the variables which are involved. Further, with the exception of studies by Ochiai and Fukumura (1953; 1956) and McGee (1961), both of which investigated the effects of frequency distortion on perceptual quality, there are no studies even to point out possible relevant variables. Frequency distortion (by band pass elimination) seems to result in changes in two dimensions of perceputal quality, a naturalness factor which is largely dependent upon the presence or absence of the fundamental frequency of the voice and an anticipation quality (or intelligibility factor). Neither of these factors seem particularly relevant for this study.

APPENDIX A

An attempted analysis of differences between manipulations by means of a sound spectrograph proved fruitless. Variations in spectrograms for one speaker repeating the same sequence of sounds and the difficulty in visually interpreting spectrograms combine to make generalizations virtually impossible.

It would appear that this study effectively demonstrates that people, when asked to do so, make judgments about personality traits from the vocal characteristics of voices. These judgments appear to be highly consistent from person to person, at least for the traits measured here. Further, these judgments can be systematically shifted in one direction or another by changing the physical characteristics of the voice sample. What remains to be accomplished is the isolation of the specific variables which would account for the shifts in perceived personality characteristics. Two possible approaches to this problem are readily apparent. First, one might have the present speech samples rated in terms of vocal qualities and then correlate these ratings with the judged personality characteristics of the speech samples. The second approach would be to repeat the study using mechanically controlled manipulation of the speech samples where changes in ratings could be directly attributed to specific physical changes in the vocal characteristics.

Summary

This report concerns an experimental investigation of perceived changes in personality characteristics ascribed to voices as a function of manipulations of vocal characteristics. The stimuli (14 speech samples) consisted of a 307 word passage read four times; in a "normal" manner, "fast", "shouting", and "soft", by three male readers plus the same passage read once each, in a "normal" voice, by two additional readers. The latter two speech samples were included to help disguise the nature of the experiment. The stimuli, after adjustments had been made to equate the speech samples in terms of loudness, were presented

to the judges (high school students) in a random order over a public address system. Perceived personality characteristics were measured by means of seventeen semantic differential rating scales.

Consistent differences emerged between two subsets of the speech conditions. The "normal" and "fast" conditions of each reader were rated similarly and the "shout" and "soft" conditions received like ratings differing from the first subset on each of the seventeen rating scales. In general, the two subsets of voice conditions present mirror image semantic profiles about the neutral position. The "fast-normal" voices were perceived as belonging to individuals who were careful, insecure, humble, excitable, emotional, undependable, lazy, and outgoing. The "shout-soft" voices were judged to belong to people who were careless, messy, emotional, intolerant, unpleasant, cruel, calm, patient and sympathetic. The differences between subsets on most of these scales were significant.

Due to lack of previous research in this area and because of the general nature of the manipulations made in the speech samples, it is not possible to specify which speech variables account for the shifts in semantic differential ratings.

APPENDIX A

References

Allport, G.W, & Cantril, H. Judging personality from voice. J. soc. Psychol., 1934, 5, 37-55.

Carroll, J.B. Vectors of prose style. In T.A. Sebeok (Ed.) Style in language. New York: John Wiley & Sons, 1960, 283-292.

Cochran, W.G., & Cox, G.M. Experimental designs. New York: John Wiley & Sons, 1959.

Eisenberg, P., & Zalowitz, E. Judging expressive movement: III. Judgments of dominance-feeling from phonograph records of voice. J. appl. Psychol., 1938, 22, 620-631.

Fay, P.J., & Middleton, W.C. Judgment of occupation from the voice as transmitted over a public address system and over a radio. J. appl. Psychol., 1939, 23, 586-601.

Fay, P.J., & Middleton, W.C. Judgments of intelligence from the voice as transmitted over a public address system. Sociometry, 1940a, 3, 186-191.

Fay, P.J., & Middleton, W.C. The ability to judge the rested or tired condition of a speaker from his voice as transmitted over a public address system. J. appl. Psychol., 1940b, 24, 645-650.

Fay, P.J., & Middleton, W.C. Judgment of Kretschmerian body types from the voice as transmitted over a public address system. J. soc. Psychol., 1940c, 12, 151-162.

Fay, P.J., & Middleton, W.C. The ability to judge sociability from the voice as transmitted over a public address system. J. soc. Psychol., 1941a, 13, 303-309.

Fay, P.J., & Middleton, W.C. The ability to judge truth-telling, or lying from the voice as transmitted over a public address system. J. gen. Psychol., 1941b, 24, 211-215.

Fay, P. J., & Middleton, W.C. Judgment of introversion from the transcribed voice. Quart. J. Speech, 1942, 28, 226-228.

APPENDIX A

Fay, P.J., & Middleton, W.C. Judgment of leadership from the transmitted voice. J. soc. Psychol., 1943, 17, 99-102.

Hildreth, R.A. An experimental study of audiences' ability to distinguish between sincere and insincere speakers. Speech Monogr., 1954, 21, 146. (Abstract)

Licklider, J.C.R., & Miller, G.A. The perception of speech. In S.S. Stevens (Ed.) Handbook of experimental psychology. New York: John Wiley & Sons, 1951, 1040-1074.

McGee, V.E. The determination of a perceptual space for the quality of filtered speech. Unpublished Ph.D. thesis. Princeton Univer., 1961.

Ochiai, Y., & Fukumura, T. Timbre study of vocalic voices. Mem. Fac. Engineering. 1953, 5, 253-280.

Ochiai, Y., & Fukumura, T. Timbre study of vocalic voices viewed from subjective phonal aspect. Mem. Fac. Engineering, 1956, 8, 1-18, 203-239.

Osgood, C.E., Suci, G.J., & Tannenbaum, P.H. The measurement of meaning. Urbana: Univer. of Illinois Press, 1957.

Pear, T.H. Voice and personality. London: Chapman and Hall, 1931.

Pear, T.H. Personality, appearance and speech. London: Allen & Unwin, 1957.

Starkweather, J.A. Content-free speech as a source of information about the speaker. J. abnorm. soc. Psychol., 1956, 53, 394-402.

Taylor, H.C. Social agreement on personality traits as judged from speech. J. soc. Psychol., 1934, 5, 244-248.

APPENDIX A

Footnotes

1 The research reported here was performed pursuant to a contract with the United States Office of Education, Department of Health, Education and Welfare, Project No. 217.

2 The author is indebted to Drs. John B. Carroll and Aaron S. Carton, Miss M.D. Morse and Miss J. Drues for their comments, suggestions, and assistance during various phases of this study. A special thanks is due to Dr. R.C. Gardner who, in addition to making contributions in the planning stages of this study, wrote the computer program which made the analysis of an enormous amount of data feasible.

3 The means and standard deviations on which Figure 1 is based are contained in Tables A-Q in the appendix.

APPENDIX A

Table A_1

Mean Ratings for Leader-Follower

			Voices			
Conditions	1	2	3	4	5	Over Voices
"Normal"	4.03	4.07	4.40	4.41	4.49	4.28
"Fast"			4.30	4.61	4.03	4.31
"Shout"			3.61	3.92	3.72	3.75
"Soft"			3.68	3.83	3.79	3.77
Over Conditions	4.03	4.07	4.00	4.19	4.01	4.06

Table A_2

Standard Deviation of Ratings
for Leader-Follower

			Voices			
Conditions	1	2	3	4	5	Over Voices
"Normal"	2.07	1.76	1.57	1.77	1.71	1.79
"Fast"			1.61	1.79	1.72	1.73
"Shout"			1.85	1.66	1.90	1.82
"Soft"			2.06	1.77	2.11	2.00
Over Conditions	2.07	1.76	1.82	1.78	1.89	1.82

APPENDIX A

Table B_1

Mean Ratings for Careless-Careful

	Voices					
Conditions	1	2	3	4	5	Over Voices
"Normal"	4.57	3.83	3.54	2.29	2.53	3.35
"Fast"			2.54	2.07	3.91	2.84
"Shout"			6.19	4.96	4.39	5.18
"Soft"			4.55	4.51	6.07	5.04
Over Conditions	4.57	3.83	4.21	3.45	4.23	4.00

Table B_2

Standard Deviation of Ratings
for Careless-Careful

	Voices					
Conditions	1	2	3	4	5	Over Voices
"Normal"	1.77	1.90	1.94	1.38	1.29	1.68
"Fast"			1.44	1.39	1.80	1.56
"Shout"			1.02	1.63	1.84	1.52
"Soft"			1.72	1.75	1.38	1.64
Over Conditions	1.77	1.90	1.55	1.56	1.60	1.62

APPENDIX A

Table C_1

Mean Ratings for Excitable-Calm

Conditions	Voices 1	2	3	4	5	Over Voices
"Normal"	4.46	4.30	4.56	6.11	5.55	5.00
"Fast"			5.67	6.01	4.52	5.40
"Shout"			1.77	3.32	3.54	2.88
"Soft"			3.11	3.45	1.93	2.83
Over Conditions	4.46	4.30	3.78	4.72	3.88	4.16

Table C_2

Standard Deviation of Ratings
for Excitable-Calm

Conditions	Voices 1	2	3	4	5	Over Voices
"Normal"	2.04	2.18	1.92	1.45	1.51	1.84
"Fast"			1.47	1.22	1.74	1.50
"Shout"			1.08	1.66	1.65	1.48
"Soft"			1.73	1.58	1.49	1.62
Over Conditions	2.04	2.18	1.57	1.50	1.60	1.62

APPENDIX A

Table D_1

Mean Ratings for Unsympathetic-Sympathetic

	Voices					
Conditions	1	2	3	4	5	Over Voices
"Normal"	2.72	4.84	4.96	5.13	4.70	4.38
"Fast"			5.32	5.09	4.08	4.83
"Shout"			3.86	3.88	2.74	3.49
"Soft"			2.18	3.34	2.95	2.82
Over Conditions	2.72	4.84	4.08	4.36	3.62	3.95

Table D_2

Standard Deviation of Ratings
for Unsympathetic-Sympathetic

	Voices					
Conditions	1	2	3	4	5	Over Voices
"Normal"	1.46	1.79	1.77	1.80	1.51	1.67
"Fast"			1.60	1.51	1.70	1.60
"Shout"			1.84	1.59	1.30	1.58
"Soft"			1.43	1.61	1.79	1.61
Over Conditions	1.46	1.79	1.66	1.63	1.58	1.62

APPENDIX A

Table E_1

Mean Ratings for Submissive-Dominating

Conditions	Voices 1	 2	 3	 4	 5	Over Voices
"Normal"	4.21	4.01	3.33	2.77	3.02	3.46
"Fast"			3.25	2.91	3.74	3.30
"Shout"			5.48	4.56	3.82	4.62
"Soft"			4.31	4.09	4.45	4.28
Over Conditions	4.21	4.01	4.09	3.58	3.76	3.85

Table E_2

Standard Deviation of Ratings
For Submissive-Dominating

Conditions	Voices 1	 2	 3	 4	 5	Over Voices
"Normal"	1.75	1.73	1.65	1.59	1.58	1.66
"Fast"			1.71	1.58	1.59	1.63
"Shout"			1.51	1.53	1.65	1.56
"Soft"			1.73	1.72	1.78	1.74
Over Conditions	1.75	1.73	1.65	1.61	1.65	1.65

Table F_1

Mean Ratings for Intolerant-Tolerant

Conditions	Voices 1	2	3	4	5	Over Voices
"Normal"	3.54	3.95	4.01	3.22	3.31	3.60
"Fast"			3.22	3.33	3.68	3.41
"Shout"			5.36	4.49	4.03	4.63
"Soft"			4.69	4.38	5.18	4.75
Over Conditions	3.54	3.95	4.32	3.86	4.05	4.03

Table F_2

Standard Deviation of Ratings
for Intolerant-Tolerant

Conditions	Voices 1	2	3	4	5	Over Voices
"Normal"	1.79	2.05	1.87	1.85	1.70	1.85
"Fast"			1.76	1.80	1.53	1.70
"Shout"			1.91	1.56	1.51	1.66
"Soft"			1.68	1.64	1.97	1.76
Over Conditions	1.79	2.05	1.81	1.71	1.68	1.76

APPENDIX A

Table G_1

Mean Ratings for Humble-Proud

	Voices					
Conditions	1	2	3	4	5	Over Voices
"Normal"	4.41	3.60	4.94	5.18	4.88	4.60
"Fast"			4.65	4.90	4.59	4.71
"Shout"			3.09	3.88	4.56	3.84
"Soft"			4.29	3.79	3.57	3.89
Over Conditions	4.41	3.60	4.24	4.44	4.40	4.31

Table G_2

Standard Deviation of Ratings
For Humble-Proud

	Voices					
Conditions	1	2	3	4	5	Over Voices
"Normal"	1.75	1.77	1.69	1.60	1.54	1.67
"Fast"			1.67	1.71	1.51	1.63
"Shout"			1.62	1.53	1.69	1.61
"Soft"			1.69	1.71	1.71	1.70
Over Conditions	1.75	1.77	1.67	1.64	1.61	1.66

APPENDIX A

Table H_1

Mean Ratings for Shy-Outgoing

	Voices					
Conditions	1	2	3	4	5	Over Voices
"Normal"	3.46	3.42	2.76	2.43	2.70	2.95
"Fast"			2.77	2.17	3.25	2.73
"Shout"			4.34	3.74	3.58	3.88
"Soft"			3.67	3.68	3.99	3.78
Over Conditions	3.46	3.42	3.38	3.01	3.38	3.28

Table H_2

Standard Deviation of Ratings
For Shy-Outgoing

	Voices					
Conditions	1	2	3	4	5	Over Voices
"Normal"	1.27	1.34	1.23	1.35	1.39	1.32
"Fast"			1.13	1.14	1.29	1.19
"Shout"			1.48	1.35	1.44	1.41
"Soft"			1.52	1.49	1.40	1.47
Over Conditions	1.27	1.34	1.34	1.33	1.38	1.34

APPENDIX A

Table I_1

Mean Ratings for Messy-Neat

			Voices			
Conditions	1	2	3	4	5	Over Voices
"Normal"	5.34	3.59	2.95	2.68	2.99	3.51
"Fast"			2.50	2.45	4.03	2.99
"Shout"			5.04	4.58	5.24	4.95
"Soft"			5.92	5.03	5.73	5.56
Over Conditions	5.34	3.59	4.10	3.68	4.50	4.15

Table I_2

Standard Deviation of Ratings
For Messy-Neat

			Voices			
Conditions	1	2	3	4	5	Over Voices
"Normal"	1.56	1.86	1.58	1.58	1.49	1.61
"Fast"			1.46	1.31	1.48	1.42
"Shout"			1.91	1.49	1.39	1.60
"Soft"			1.09	1.42	1.62	1.38
Over Conditions	1.56	1.86	1.51	1.45	1.50	1.52

APPENDIX A

Table J_1

Mean Ratings for Insecure-Secure

Conditions	Voices 1	2	3	4	5	Over Voices
"Normal"	5.51	3.90	5.15	5.65	5.10	5.06
"Fast"			5.04	5.22	4.49	4.91
"Shout"			3.35	4.20	5.26	4.27
"Soft"			4.95	4.46	4.38	4.60
Over Conditions	5.51	3.90	4.62	4.88	4.81	4.76

Table J_2

Standard Deviation of Ratings For Insecure-Secure

Conditions	Voices 1	2	3	4	5	Over Voices
"Normal"	1.71	1.79	1.73	1.33	1.48	1.61
"Fast"			1.67	1.60	1.59	1.62
"Shout"			1.97	1.73	1.50	1.73
"Soft"			1.65	1.62	1.77	1.35
Over Conditions	1.71	1.79	1.76	1.57	1.59	1.58

APPENDIX A

Table K_1

Mean Ratings for Dependent-Independent

Conditions	Voices 1	2	3	4	5	Over Voices
"Normal"	2.76	4.45	3.96	3.53	3.74	3.69
"Fast"			4.21	3.64	3.90	3.92
"Shout"			4.67	4.05	2.86	3.86
"Soft"			2.85	3.65	3.74	3.41
Over Conditions	2.76	4.45	3.92	3.72	3.56	3.71

Table K_2

Standard Deviation of Ratings
For Dependent-Independent

Conditions	Voices 1	2	3	4	5	Over Voices
"Normal"	1.66	1.74	1.68	1.88	1.83	1.76
"Fast"			1.66	1.76	1.63	1.68
"Shout"			1.99	1.66	1.47	1.71
"Soft"			1.71	1.66	1.97	1.78
Over Conditions	1.66	1.74	1.76	1.74	1.73	1.74

APPENDIX A

Table L_1

Mean Ratings for Impatient-Patient

	Voices					
Conditions	1	2	3	4	5	Over Voices
"Normal"	2.32	4.77	3.42	4.06	4.29	3.77
"Fast"			4.67	4.59	4.05	4.44
"Shout"			2.37	3.24	2.60	2.74
"Soft"			2.21	2.94	1.74	2.30
Over Conditions	2.32	4.77	3.18	3.71	3.17	3.38

Table L_2

Standard Deviation of Ratings
For Impatient-Patient

	Voices					
Conditions	1	2	3	4	5	Over Voices
"Normal"	1.33	1.72	1.41	1.43	1.36	1.45
"Fast"			1.50	1.43	1.55	1.49
"Shout"			1.57	1.52	1.36	1.48
"Soft"			1.33	1.37	1.17	1.29
Over Conditions	1.33	1.72	1.45	1.44	1.36	1.43

APPENDIX A

Table M_1

Mean Ratings for Unpleasant-Pleasant

	Voices					
Conditions	1	2	3	4	5	Over Voices
"Normal"	5.21	3.84	3.18	3.11	3.27	3.72
"Fast"			2.68	3.14	3.90	3.24
"Shout"			5.11	4.72	5.24	5.02
"Soft"			5.76	4.83	5.30	5.30
Over Conditions	5.21	3.84	4.18	3.95	4.43	4.24

Table M_2

Standard Deviation of Ratings
For Unpleasant-Pleasant

	Voices					
Conditions	1	2	3	4	5	Over Voices
"Normal"	1.40	1.67	1.62	1.74	1.66	1.62
"Fast"			1.57	1.65	1.34	1.52
"Shout"			1.57	1.33	1.36	1.42
"Soft"			1.32	1.53	1.44	1.43
Over Conditions	1.40	1.67	1.52	1.56	1.45	1.52

APPENDIX A

Table N_1

Mean Ratings for Emotional-Unemotional

Conditions	Voices 1	2	3	4	5	Over Voices
"Normal"	5.60	4.17	4.85	5.44	5.07	5.03
"Fast"			4.63	5.20	4.47	4.77
"Shout"			3.97	4.37	5.04	4.46
"Soft"			5.11	4.52	4.53	4.72
Over Conditions	5.60	4.17	4.64	4.88	4.78	4.78

Table N_2

Standard Deviation of Ratings
For Emotional-Unemotional

Conditions	Voices 1	2	3	4	5	Over Voices
"Normal"	1.51	1.71	1.71	1.48	1.54	1.59
"Fast"			1.72	1.68	1.50	1.63
"Shout"			2.01	1.51	1.75	1.76
"Soft"			1.79	1.63	1.73	1.72
Over Conditions	1.51	1.71	1.81	1.58	1.63	1.66

APPENDIX A

Table O_1

Mean Ratings for Cruel-Kind

Conditions	Voices 1	2	3	4	5	Over Voices
"Normal"	5.00	3.17	3.27	3.07	3.14	3.53
"Fast"			2.90	2.88	3.80	3.19
"Shout"			4.82	4.53	5.02	4.79
"Soft"			5.46	4.60	5.24	5.10
Over Conditions	5.00	3.17	4.11	3.77	4.30	4.07

Table O_2

Standard Deviation of Ratings
For Cruel-Kind

Conditions	Voices 1	2	3	4	5	Over Voices
"Normal"	1.60	1.59	1.51	1.58	1.41	1.54
"Fast"			1.32	1.35	1.40	1.36
"Shout"			1.73	1.44	1.35	1.51
"Soft"			1.33	1.53	1.64	1.50
Over Conditions	1.60	1.59	1.47	1.48	1.45	1.49

APPENDIX A

Table P_1

Mean Ratings for Undependable-Dependable

Conditions	Voices 1	2	3	4	5	Over Voices
"Normal"	3.62	4.15	5.10	5.13	4.99	4.60
"Fast"			4.84	5.58	4.37	4.93
"Shout"			2.98	3.97	4.07	3.67
"Soft"			3.64	4.12	3.54	3.76
Over Conditions	3.62	4.15	4.14	4.70	4.24	4.29

Table P_2

Standard Deviation of Ratings
For Undependable-Dependable

Conditions	Voices 1	2	3	4	5	Over Voices
"Normal"	1.58	1.74	1.38	1.68	1.68	1.61
"Fast"			1.51	1.42	1.50	1.48
"Shout"			1.56	1.45	1.60	1.54
"Soft"			1.66	1.59	1.54	1.60
Over Conditions	1.58	1.74	1.53	1.54	1.58	1.57

APPENDIX A

Table Q_1

Mean Ratings for Lazy-Energetic

Conditions	Voices 1	2	3	4	5	Over Voices
"Normal"	5.40	3.54	4.57	5.09	4.88	4.69
"Fast"			4.81	5.52	3.90	4.74
"Shout"			2.93	3.80	4.69	3.81
"Soft"			4.79	4.19	3.84	4.27
Over Conditions	5.40	3.54	4.28	4.65	4.33	4.42

Table Q_2

Standard Deviation of Ratings
For Lazy-Energetic

Conditions	Voices I	2	3	4	5	Over Voices
"Normal"	1.84	2.03	1.85	1.80	1.72	1.85
"Fast"			1.79	1.54	1.74	1.69
"Shout"			1.80	1.78	1.60	1.73
"Soft"			1.61	1.63	1.90	1.71
Over Conditions	1.84	2.03	1.76	1.69	1.31	1.76

APPENDIX B

A Factor Analysis of Literary Style[1]

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Part 1 (Provisional)

The roots of this study are to be found in four widely separated disciplines: psycholinguistics, statistical linguistics, psychometrics, and literary criticism. The problem is one of attempting to determine objectively a number of basic ways (referred to herein as "dimensions") in which prose materials vary stylistically. The study is being done not only for its own sake but also with the hope that it may facilitate later investigations into aspects of personality which may function in the production of varying written styles.

I am frank in saying that I do not consider myself an expert on literary style, nor even an amateur literary critic. My only plea is that I believe myself capable of applying to the study of literary style a number of techniques which are ordinarily outside the ken (or perhaps beneath the ken) of the savant who restricts himself to purely subjective modes of interpretation. If my techniques are not always perfectly objective, I am at least concerned with the extent to which consensual agreements can be reached and with the extent to which these agreements manifest consistency. Only if the reader will temporarily put aside any reservations he may have concerning the attempt to quantify and objectify something which may seem to him inherently unquantifiable and unobjectifiable can he come to appreciate the possible virtues of the approach which is being taken here.

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[1] Part 1 was written expressly for advance distribution in connection with the SSRC Conference on Style to be held at Indiana University in April 1958; at the time of writing, the final results of the study were not available. Part 2 will be circulated at a later date and will contain the results of the study and whatever interpretations may appear appropriate. I am indebted to Marilyn Brachman and Frederic Weinfeld, research assistants on the project, for their patient and intelligent help. This paper constitutes Report No. 1 of a project supported by Contract SAE-7151 with the U. S. Office of Education, "Personality Factors in the Development of Communication and Leadership Skills." Reproduction in whole or in part is permitted for any purpose of the United States Government.

The objective study of literary style by means of statistical analysis is not a completely novel endeavor. Let me remind you of the attempts of Yule (1944), the British statistician who doubled as a literary detective, to resolve the problem of the authorship of De Imitatio Christi. Or let me call to your attention the recent work of the French literary statistician Guiraud (1954) with his studies of the vocabularies of French poets, or the work of the German scholars Wilhelm Fucks (1955) and Annemarie Schlismann (1955) with their mathematical studies of stylistic variations, or the work of the Britisher Herdan (1956). At the same time let me point out that none of these scholars has ventured to ask the question which I am asking here: What are the basic dimensions in which style varies? Each of them has seized on one or another of the possible ways of measuring style without necessarily considering its relations to other measures.

The approach I have taken is facilitated by the current availability, at long last, of machinery for the convenient handling of large masses of quantitative data. The basic design is one which psychologists have long used in the objective study of personality and other aspects of human behavior. Their procedure has been to apply a series of tests or other measurement procedures to a heterogeneous sample of human personalities, then to analyze the basic dimensions of personality by a statistical procedure known as factor analysis. I propose to study in like manner the "personalities" of a heterogeneous sample of literary styles.

Procedure

The Sample

The success of a factor analysis depends partly upon the extent to which the underlying data represent the broadest possible range of multidimensional variation obtainable. For example~~,~~ a factorial study of the personalities of the inmates of a mental hospital, while feasible, would not be be as satisfactory as one applied to a sample of the general population. In the present case the problem was one of selecting a highly heterogeneous sample of written materials, representing a wide variety of literary and non-literary styles. We did this by blocking out the design of our sample in terms of a number of categories; the actual distribution of the 150 selections which were eventually assembled is presented in Table 1.

Table 1 about here

From here the selection was made by what might be called studied serendipity. Two of my assistants were turned loose in Widener Library stacks with instructions to fulfil the specifications of the sample design; I did not attempt to supervise their selections in detail, but I am satisfied that the sample they selected was sufficiently varied. They did, to be sure, receive assistance from specialists in certain categories of literature. Certain restrictions were placed on the selections. First, they had to have been written originally in English; second, they had to have been written after the year 1800 (actually, a few were slightly earlier); and third, they had to be passages which were more or less self-contained in about 300 words, for that was the maximum length that we thought could be studied within the time and means at our disposal. There was an effort

Appendix B -

Table 1.

Classification of the 150 Style Samples Studied

Type	No.
Adventure Narrative	3
Advertisements	4
Aesthetic Criticism:	
Art	3
Music	1
Literary	8
Stage, cinema, ballet	3
Anecdote	1
Biography	7
Clinical Reports:	
Medical	1
Psychological	4
Condensations	2
Essays:	
Literary	8
Editorials	6
Features in periodicals	2
Personality sketches	3
Philosophical	2
Miscellaneous	1
Fantasy	
Children's stories	3
Science fiction	1
Gossip column	1
High school textbooks	4
History	5
How-to-do-it instructions	5
Humor	3
Inspiration and advice	4
Journalistic reporting	4
Judicial decisions	3
Legal documents	3
Letters	3
Novels:	
19th century British	3
19th century American	4
20th century British	1
20th century American	6
Personal diaries	5
Popular science	4
Professional and scholarly journals	4
Short stories	6
Social criticism	2
Speeches	5
Sports writing	4
Travel guides	4
Writing assignments (high school)	4
Total	150

to obtain variation even within categories; for example, within the category novel a wide range of styles and periods was represented, from both Britain and America, and here it was possible to select passages from a number of authors whose styles are well known as distinctive, e.g. Henry James, William Faulkner, Thomas Hardy and John Dos Passos. At the same time, it must be emphasized that extreme catholicity was displayed in the selections. For our purposes, Mickey Spillane was quite as acceptable as Jane Austen; the magazine Confidential was represonted alongside a selection from the Christian Science Monitor. In order to insure that some "bad" writing was included, we selected several low-grade high-school English compositions for our sample.

After the passages had been selected, they were typed double-spaced in a uniform manner on purple duplicator masters, one to a page, in order to produce the number of copies which would be needed for analysis. Each selection was identified only by a code number, and the 150 selections were made up into spiral-bound booklets for convenience in handling. The title given to this collection, "A Sub-Sub-Treasury of Literary Style," may indicate our attitude toward it.

Measures Applied to the Passages.

The nature of our data tended to limit to some degree the kinds of measures which we could employ. Our samples were only a little more than 300 words in length, each, and it was therefore not sensible to apply any of the measures proposed by Guiraud (1954), measures which are appropriate only for studying the vocabulary represented by thousands of words of text. In any case, we felt that the sort of literary style which we were interested in investigating is the sort that would be already apparent rather clearly by the time a reader gets through 300 words. Another factor tending to limit the kinds of measures we might employ was the time available. One can conceive certain types of measures which might be highly meaningful but which would take an enormous investment of time; such a measure, for example, might be the determination of the relative frequency of each word in some standard frequency list such as Lorge's magazine count (1944) and the assignment of relative difficulty of vocabulary from the average frequency of the word. Any such idea had to be ruled out at the start. The measures actually employed were burdensome enough in themselves.

The measures employed may be classified into two major divisions: the subjective" measures and the "objective" measures. The subjective measures consisted of ratings of the passages on 29 7-point rating scales constructed after the fashion of those which Osgood and his associates (1957) at the University of Illinois have used to obtain "semantic differential" measurements of "meaning." These ratings were obtained from 8 judges, each of whom rated all 150 passages on the same rating form but in different orders of presentation to counterbalance practice and fatigue effects. The 8 judges were all persons with some degree of special interest and competence in the field of English literature; one of them holds a doctor's degree in English literature, one is a free-lance writer, several are graduate students with college English majors preparing to be secondary school English teachers, and several are simply graduate students in education with college English majors but no other special qualifications.

The rating form and the instructions to the raters are attached as Appendix A and Appendix B, respectively.

The decision to confine the subjective ratings to the 29 adjectival scales was made in the interests of simplicity and in the hope of meeting the deadline imposed by the April 1958 style conference. It was expected that the averaged ratings from 8 judges would be sufficiently stable and reliable to yield useful measurements; if statistical analysis should prove that they were not, this in itself would be a point of interest.

Considerable thought was put into the selection of the scales on which our samples would be rated. The first four scales were more or less arbitrarily chosen as dimensions of "content" rather than style. We were not actually interested in the dimensions of content, and the inclusion of these scales is justified more by the hope that they would draw the rater's attention to the distinction between content and style than by any intrinsic interest in these scales. The remaining 25 scales were supposed to be ratings of "style" rather than content, and it is on these that we tried to use judgment and discrimination.

Several sources of ideas were used for selection of the adjectival scales for the style ratings. In the background were the findings of Osgood, Suci and Tannenbaum (1957) to the effect that three main "connotative" dimensions tend to be found for almost any sample of objects, whether they are sets of concept words, political figures, or what not: the dimensions of _evaluation_, _activity_, and _potency_. It seemed reasonable that written communications of any sort would lend themselves to stylistic characterization in terms of such adjectival scales as _good-bad_, _active-passive_, and _strong-weak_, corresponding to the three Osgoodian connotative dimensions. Of special relevance was a study by W. T. Tucker, one of Osgood's students, reported in the _Measurement of Meaning_ (1957)

Tucker had assembled a series of 40 adjectival rating scales by getting artists' and non-artists' free associations to color slides of paintings and by drawing from the free-responce comments of visitors to an arts festival. Using these 40 scales in a conventional "semantic differential" design involving ratings of seven representational paintings, Tucker's data revealed the same three factors in aesthetic judgments that had been found in studies of words. We felt that many of Tucker's scales might be appropriate for our purposes, and some of his scales suggested other, related scales which could be employed.

Another source of ideas was Roget's thesaurus, which happens to contain a section expressly devoted to words useful for characterizing style. The five major headings employed by Roget are as follows: Perspicuity-Obscurity, Conciseness-Diffuseness, Vigour-Feebleness, Plainness-Ornament, and Elegance-Inelegance.

From an examination of all the materials at hand, including Tucker's scales, the categories suggested by Roget's thesaurus, and an assortment of miscellaneous hunches from personal experience and observation, a preliminary classification of dimensions was arrived at. This classification is shown in Table 2 together with the adjectival scales classified under each heading.

Table 2 about here

In setting up the final rating sheet, we took the precaution of putting the scales in a more or less random order, at the same time being sure that no two adjacent scales were from the same group. Furthermore, the polarities of the scales were deliberately randomized; that is, insofar as every scale is to some extent "evaluative" the "good" or "desirable" end of the scale is either at the left or at the right, at random. This arrangement follows usual practices in the construction of rating scales and tends to minimize the so-called "halo" effect in rating. The scale "bad-good" was deliberately placed at the end of the list in order to suggest

Table 2

Classification of Adjectival Scales

Aesthetic Quality

6 graceful-awkward

29 bad-good

26 pleasant-unpleasant

11 uncouth-elegant

Communicativeness

5 succinct-wordy

18 chaotic-ordered

13 clear-hazy

21 vague-precise

Variety

28 florid-plain

8 austere-lush

14 interesting-boring

25 complex-simple

17 original-trite

23 monotonous-varied

Vigor

19 vivid-pale

7 placid-vigorous

22 masculine-femine

15 weak-strong

Humor

27 serious-humorous

9 flippant-earnest

Personal Appeal

10 intimate-remote

20 impersonal-personal

12 natural-affected

Affective Tone

16 impartial-opinionated

24 emotional-rational

that we wished an overall evaluation of the passage at that point.

Table 2 is in effect a set of hypotheses about some of the dimensions of literary style. The primary purpose of evolving these hypotheses was to make it more probable that we had covered all the significant dimensions of characterization in our rating scale. Furthermore, because of the requirements of the statistical technique of factor analysis which we were to employ, it was necessary to assure ourselves that each possible dimension was "overdetermined," that is, represented by at least two scales. Aside from the fact that some of the scales are almost exact semantic duplicates of one another, there is nothing in Table 2 which predetermines the outcome of the analysis.

For establishing objective measures of style, we sought ideas and suggestions from a number of sources. In the first place, our work could be regarded as in the tradition of Busemann's (1925) and Boder's (1940) studies of the adjective-verb quotient. There is evidence, however, to suggest that the taking of a ratio between verb and adjective frequencies may hide significant variation, and that therefore it would be wiser to obtain separate measures of verb and adjective incidence, with the possibility of taking ratios at a later stage. As a matter of fact it was decided to make a rather comprehensive series of counts of most of the conventional parts of speech. Our decisions in this area were aided by consideration of the results of a recent doctoral dissertation by R. E. Miller (1957), who studied the correlations between incidences of 13 grammatical categories in a sample of compostions written in a college freshman English course. He found that the incidence of pronouns and verbs was inversely related to that of nouns and articles; the occurrence of adjectives was largely independent of that of any other part of speech. Our own counts of parts of speech were based on a somewhat finer classification than was Miller's;

for example, we distinguished between descriptive and determining adjectives and between various kinds of pronouns.

One of the most extensive studies of speech and personality variables, which utilized a large number of "psychogrammatical" categories, was made by Sanford (1942) some years ago. Sanford went considerably beyond the mere counting of parts of speech; he constructed measures of sentence structure, used a large number of refined grammatical categories, and even counted figures of speech and stylistic devices. A considerable number of our measures were derived from, or adapted from, measures used by Sanford. It was necessary, however, to select only measures for which we believed there would be sufficient variation manifested in 300-word samples to make counting worthwhile.

One other source of suggestions for measures which might be employed in studying prose style was the considerable literature (Chall, 1958) on various aspects of "readability" or style difficulty. Readability has been shown to be related to the extent to which readers of various degrees of education can comprehend written material. There are probably several dimensions of readability but this problem has never been adequately studied. Flesch (1949, 1950) has proposed measures of "Readability Level," "Human Interest," and "Level of Abstraction." These measures depend upon simple counts of such things as the number of syllables per 100 words, the number of personal pronouns, and the like. Gillie (1957) has attempted to simplify Flesch's procedure for measuring abstraction. A number of the measures used in this study are taken directly or adapted from procedures developed by Flesch, Gillie, and others.

Table 3 presents the complete list of objective measures used in this study and for which results are reported in the second part of this paper. We do not have any particular hypotheses concerning the manner in which

Table 3

List of Objective Measures of Style
(All measures are in terms of 300-word samples)

Number	Description
101	Number of paragraphs
102	Number of syllables
103	Number of sentences
104	Standard deviation of sentence length
120	Number of clauses (independent and dependent); equals number of finite verbs.
121	Clause complexity index
122	Proportion of noun clauses to all dependent clauses
123	" " adjectival " " " " "
124	" " adverbial " " " " "
125	" " parenthetical" " " "
	(Measures 140-148 refer only to finite verbs)
140	Proportion of "action" verbs to total verbs less copulas.
141	" " "cognitive" " " transitive verbs.
142	" " transitive " " total verbs
143	" " intransitive" " " "
144	" " copulas to total verbs
145	" " Latin-Greek derivative verbs to total verbs less copulas.
146	" " passive verbs to all transitive
147	"Mean tense", past to future.
148	Entropy of tense distribution
149	Total number of infinitives
150	Total number of participles
151	Total number of gerunds
160	Total number of proper nouns or proper noun phrases
161	Total number of common nouns
162	Proportion of unmodified common nouns preceded by the
163	Proportion of common nouns ending in Gillie's suffixes (-ness, -ment, -ship, -dom, -nce, -ion, -y except diminutives)
164	Proportion of common nouns having Latin Greek etymology
170	Number of articles (a, the)
171	Proportion of indefinite article a to all articles
172	Number of personal pronouns and reflexive pronouns (excluding possessives)
173	Number of possessive pronouns
174	Number of indefinite pronouns
175	Number of indefinite and quantifying determiners
176	Number of demonstrative pronouns
177	Numerical expressions
178	Number of prepositions
180	Number of non-participial descriptive adjectives
181	Number of participial modifiers preceding a noun
182	Proportion of descriptive adjectives with Latin-Greek etymology

these measures will tend to cluster in the correlational analysis. It is our hope, at any rate, that many of these measures will show significant relationships to the subjective measures discussed earlier.

Wherever feasible, these measures are being obtained separately on the first and second halves of the 300-word samples; in this way it may be possible to make some estimates of the characteristic stability of the measures.

* * * * * * * * * * * *

Part II will contain the following tables and interpretations thereof:

a. Reliability values for the subjective ratings

b. Reliability values for the objective measures

c. Intercorrelations of all the measures based on the 150 passages studied

d. Rotated factor matrix giving the loadings of each measure on each factor

e. Factor score profiles for selected passages to illustrate the applicability of the procedure to the indexing of literary style.

REFERENCES

Boder, D. P. The adjective-verb quotient: a contribution to the psychology of language. *Psychol. Rec.*: 1940, *3*, 310-343.

Busemann, A. *Die Sprache der Jugend als Ausdruck der Entwicklungsrhythmic*. Jena: Fisher, 1925.

Chall, Jeanne S. *Readability: An Appraisal of Research and Application*. Columbus, Ohio: Bureau of Educational Research, Ohio State University, 1958. (Bureau of Educ. Research Monographs, No. 34). 202 p.

Flesch, R. *The art of readable writing*. New York: Harper, 1949. 237 p.

Flesch, R. Measuring the level of abstraction. *J. appl. Psychol.*, 1950, *34*, 384-390.

Fucks, W. *Mathematische Analyse von Sprachelemente, Sprachstil und Sprache*. Köln: Westdeutscher Verlag, 1955. 110 p.

Gillie, Paul J. A simplified formula for measuring abstraction in writing. *J. appl. Psychol.*, 1957, *41*, 214-217.

Guiraud, Pierre. *Les caractères statistiques du vocabulaire*. Paris: *Presses* Universitaires de France, 1954. 116 p.

Herdan, G. *Language as choice and chance*. Groningen, Holland: P. Noordhoff N. V., 1956. 356 p.

Miller, Robert E. *An analysis of certain psychogrammatical categories in expository verbal situations*. Unpublished Ph. D. Dissertation, University of Minnesota, July 1957.

Osgood, Charles E., Suci, George J., and Tannenbaum, Percy H. *The measurement of meaning*. Urbana, Ill.: Univ. of Illinois Press, 1957. 342 p.

Sanford, Fillmore H. Speech and personality: a comparative case study. *Character and Personality*, 1942, *10*, 169-198.

Schliemann, Annemarie. *Der Mensch und sein Wort*. Innsbruck: Verlag Felizian Rauch, 1955. 180 p.

Thorndike, E. L. and Lorge, Irving. Teacher's word book of 30,000 words. New York: Bureau of Publications, Teachers College, Columbia Univ., 1944.

Yule, G. Udny. The statistical study of literary vocabulary. Cambridge, England: Cambridge Univ. Press, 1944. viii + 306 p.

A Factor Analysis of Literary Style

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Part 2

RESULTS OF STATISTICAL ANALYSES

Characteristics of the Subjective Ratings

How much did the judges agree in their ratings of the 150 passages on the 29 scales? A statistical answer to this question is provided by the coefficient of reliability, a special application of the measure of correlation known as the Pearsonian product-moment correlation coefficient. A coefficient of 1.00 would denote perfect agreement, and one of .00 would denote completely random agreement. Table 4 presents the reliability coefficients obtained for the averaged ratings made by the eight judges; each value may be interpreted as the estimated correlation which would be obtained between the present set of ratings and a second, equivalent set of ratings from eight other judges. The reliabilities range from .641, for the scale weak-strong, to .916, for the scale humorous-serious, with a median at .803. They are high enough, in every case, to suggest that the averaged ratings are sufficiently reliable for use in further analysis. The lack of perfect agreement among the judges can be ascribed to a number of sources. The measurement technician will recognize that some of the unreliability is due to random fluctuations in the use of a numerical scale: the ratings of even a single judge made on several different occasions would not agree perfectly. More importantly, unreliability is due to different bases of judgment on the part of the various raters, and probably also to different degrees of appropriateness of the adjectival scales. The scales meaningless-meaningful and chaotic-ordered have reliabilities as low as .69 because, we

Table 4

Means, Standard Deviations and Reliabilities of Averaged Ratings of 150 Passages made by 8 Raters

	Scale (1) (4) (7)	Mean	S.D.	Reliability*
(CONTENT)				
1.	superficial - profound	3.91	1.28	.841
2.	obvious - subtle	3.33	1.29	.806
3.	concrete - abstract	3.20	1.60	.895
4.	meaningless - meaningful	5.20	1.01	.696
(STYLE)				
5.	wordy - succinct	4.39	1.21	.775
6.	awkward - graceful	4.31	1.03	.730
7.	placid - vigorous	4.60	1.08	.802
8.	austere - lush	4.03	.94	.803
9.	flippant - earnest	5.33	1.24	.872
10.	remote - intimate	4.20	1.31	.869
11.	uncouth - elegant	4.09	.83	.823
12.	affected - natural	4.34	1.21	.804
13.	hazy - clear	5.46	1.17	.776
14.	boring - interesting	4.90	1.19	.777
15.	weak - strong	4.60	.91	.641
16.	impartial - opinionated	4.54	1.37	.888
17.	trite - original	4.34	1.08	.768
18.	chaotic - ordered	4.87	1.00	.690
19.	pale - vivid	5.03	1.07	.795
20.	impersonal - personal	4.21	1.40	.858
21.	vague - precise	5.00	1.04	.706
22.	feminine - masculine	4.67	1.17	.850
23.	monotonous - varied	4.11	1.12	.749
24.	rational - emotional	4.03	1.45	.896
25.	simple - complex	3.92	1.21	.822
26.	unpleasant - pleasant	4.56	1.09	.748
27.	humorous - serious	5.58	1.31	.916
28.	plain - florid	4.05	1.07	.820
29.	bad - good	4.48	1.07	.736

* Reliabilities were determined by the technique presented by Robert Ebel, Psychometrika, 1951, 16, 407-424. They are the estimated reliabilities of the final *averaged* ratings; the reliability of the ratings assigned by a single judge could be estimated, if desired, by "stepping down" the former value by the Spearman-Brown prophecy formula.

may guess, judges differ in their conceptions of how these terms apply to prose passages, and the scale *weak-strong* has a reliability of only .64 because, perhaps, it can be applied to literary style only by a somewhat remote metaphorical extension. On the other hand, it is useful to know that judges can agree well in applying adjectives like *serious*, *abstract*, *emotional*, *opinionated*, *earnest*, *intimate*, *personal*, *masculine*, and *profound*.

Table 4 also shows the means and standard deviations of the averaged ratings. These results are gratifying because they indicate that the 150 prose passages which were selected for study are highly heterogeneous, covering nearly the whole spectrum of variation on each of the 29 scales. The *mean* averaged ratings, however, tend to lie toward the more "favorable" ends of the scales. That is, on the average the passages were judged to be more *meaningful* than *meaningless*, more *succinct* than *wordy*, more *graceful* than *awkward*, more *earnest* than *flippant*, etc. This finding probably reflects the fact that the passages were on the whole taken from sources from which one can expect good writing. On the other hand, the results indicate that the passages were on the average judged more *superficial* than *profound*, more *obvious* than *subtle*, more concrete than *abstract*, and more simple than *complex*. This may reflect the fact that the passages were selected more from literature intended to entertain than from literature intended to instruct or to inspire.

Characteristics of the Objective Measures of Style

Means, standard deviations, and reliabilities for the objective measures are shown in Table 5. The means and standard deviations are presented mainly for their usefulness as parameters by which one can compare the present sample with others; however, because of the care taken in choosing the present sample, these values may probably be regarded as close to the values which would be

TABLE 5

Means, Standard Deviations, Reliabilities, and Communalities (h^2) of the Objective Measures of Style

(All measures are for 300-word samples)

No.	Measure	Mean	S.D.	rel.*	h^2**	transformation***
30	Number of paragraphs started	4.00	2.75	-	.38	2
31	Number of syllables	451.85	45.97	.860	.73	-
32	Number of sentences started	14.43	5.85	.850	.48	2
33	Standard deviation of sentence length	14.15	11.44	.166	.37	2
34	Number of clauses (both independent and dependent)	30.97	8.65	.779	.81	-
35	Clause complexity index	8.30	3.45	.605	.33	-
36	Proportion of noun clauses	.268	.201	-	.38	3
37	Proportion of adjectival clauses	.334	.198	-	.28	3
38	Proportion of adverbial clauses	.339	.189	-	.14	3
39	Proportion of parenthetical clauses	.049	.092	-	.09	3
40	Proportion of "action" verbs	.335	.227	.762	.60	3
41	Proportion of "cognitive" verbs	.157	.142	.575	.30	3
42	Proportion of transitive verbs	.583	.126	.331	.50	3
43	Proportion of intransitive verbs	.122	.083	.26	.25	3
44	Proportion of copulas	.283	.114	.44	.31	3
45	Proportion of Latin-derived verbs	.355	.250	.57	.33	3
46	Proportion of passive verbs	.186	.175	.49	.45	3
47	"Mean tense" (1 = Past; 3 = Future)	1.58	.38	.88	.27	-
48	Entropy of tense distribution	.447	.260	.42	.13	-
49	Number of infinitives	4.28	2.73	-	.20	2
50	Number of participles	3.27	3.01	-	.21	2
51	Number of gerunds	2.24	2.08	-	.20	2
52	Number of proper nouns	8.31	8.01	.83	.39	2
53	Number of common nouns	60.89	12.56	.74	.50	-
54	Proportion of unmodified common nouns preceded by *the*	.080	.068	.45	.42	3
55	Proportion of nouns ending in Gillie's suffixes	.185	.105	.69	.64	3
56	Number of articles	27.69	7.39	.52	.34	-
57	Proportion of indefinite articles	.287	.133	.48	.28	3
58	Number of personal and reflexive pronouns	16.[illegible]6	10.21	.84	.83	2
59	Number of possessive pronouns	6.19	3.94	.64	.39	2

Table 5 (cont.)

No.	Measure	Mean	S.D.	rel*	h^2**	transformation ***
60	Number of indefinite pronouns	1.57	1.76	.43	.28	2
61	Number of indefinite and qualifying determiners	7.05	3.50	.27	.33	2
62	Number of demonstrative pronouns	3.25	2.34	.44	.14	2
63	Number of numerical expressions	3.91	4.51	.67	.33	2
64	Number of prepositions	35.95	7.28	.58	.40	-
65	Total number of pronouns	24.16	12.90	.83	.87	-
66	Total number of determiners	17.64	6.31	.52	.45	2
67	Number of descriptive adjectives	18.01	7.49	.66	.36	2
68	Number of participial modifiers of nouns	3.11	2.23	.38	.18	2

*Reliabilities were computed by "stepping-up" the between-halves correlations by means of the Spearman-Brown prophecy formula.

**These communalities are based on all 7 centroid factors which were extracted.

***Because dissimilar marginal distributions imply non-linear relations between variables, scores whose distributions appeared on inspection to be significantly non-symmetrical were subjected to one of the following transformations, as indicated above:

2: $X' = 45 \log_{10} (X + 1)$ [for log normal distributions]

3: $X' = 63.662 \sin^{-1} \sqrt{p}$ [where the scores are proportions].

obtained for a much larger sample. For example, we find that the average number of syllables for 300 words is 451.85; the resulting value of about 1 1/2 syllables per word may be taken as typical for samples of written English.

Of most interest are the reliabilities for the measures, obtained by finding the correlation between measures for the first and second halves of the passages and estimating (by the conventional Spearman-Brown formula) the correlation which would exist between the values for a 300-word sample and another, equivalent 300-word sample. It was not always feasible to compute a split-half correlation, and in these cases one may gain some impression of the reliabilities by inspecting the communalities computed from the factor analysis (to be discussed below). In theory, the reliability of a variable should be at least as great as its communality; while it may or may not be considerably greater than the communality, if the communality approaches unity the reliability also must approach unity.

On the whole, the reliabilities for the objective measures of style tend to be considerably lower than those for the subjective measures; they range from .17 to .88, with a median of .57. This means that the characteristics of prose which we have chosen to measure tend not to be very stable from one half of a passage to the next half of the same passage. There are, however, some characteristics which are quite stable, e.g., the number of syllables per 300 words, the number of sentences started in 300 words, the number of clauses, the proportion of "action" verbs, and the number of proper nouns, all these measures having reliabilities greater than .75.

It is also of interest to study the relation between the reliabilities of the measures and their communalities. The communality is a coefficient ranging between .00 and 1.00 which indicates the extent to which a variable measures something in common with the other variables in a given set (in this case, the complete set of 68 subjective and objective measures of style). When the communality is low, it may denote that the variable has a low reliability, but if the reliability is known to be high, a low communality denotes that the variable has high "specific" variance, that is, that it measures something which is not measured by any variable in the set. There are quite a number of variables which seem to have high specific variance, e.g. variable 32 (number of sentences), variable 47 ("mean tense"), and variable 52 (number of proper nouns). Evidently these are characteristics of style which are highly stable and yet not much related to other measures of style.

Correlations Among the Subjective Measures

The 406 different intercorrelations among the 29 rating scales are presented in Table 6. It will be noted, incidentally, that some of the scales have been "reflected" (i.e., the ends have been interchanged) in order to make the correlations preponderantly positive. For example, in the original rating scale the scales for clear-hazy and vague-precise had opposite polarities, a rating of "7" meaning hazy in the first case and precise in the second. The correlation between the scales was originally -.86, but changing the sign to positive implies that the scales are to be taken with the same polarity. It was not possible, however, to make all the correlations positive by this procedure; there seem to be some intrinsically negative relationships, as will be seen more clearly from the factor analysis.

The correlations among scales which are clearly related semantically are in general high, as would be expected. Contrariwise, correlations between semantically unrelated scales were in general low. One would be concerned if this were not the case. On the other hand, the relationships are complex and cannot be predicted completely from the semantics of the terms. For example,

Table 6

Intercorrelations Among the 29 Subjective Ratings

N = 150 passages

(Decimal points omitted)

Positive end of scale		profound 1	subtle 2	abstract 3	meaningful 4	succinct 5	graceful 6	vigorous 7	lush 8	earnest 9	intimate 10	elegant 11	natural 12	clear 13	interesting 14	strong 15	opinionated 16	original 17	ordered 18	vivid 19	personal 20	precise 21	masculine 22	varied 23	emotional 24	complex 25	pleasant 26	serious 27	florid 28	good 29
profound	1	100	65	71	62	-02	42	05	-03	55	-23	54	00	-06	30	37	21	44	24	00	-17	-18	27	33	-16	47	29	54	07	38
subtle	2	65	100	72	16	-25	34	-03	25	05	-22	55	-32	-41	24	21	16	68	-10	05	-07	-43	-03	38	-01	68	23	09	34	29
abstract	3	71	72	100	07	-44	18	12	28	28	-19	49	-41	-46	04	06	43	30	-15	-10	-03	-59	05	19	08	65	02	29	43	04
meaningful	4	62	16	07	100	41	48	07	-27	46	-08	29	42	50	51	60	-07	26	58	19	-16	42	34	41	-27	-06	54	38	-29	63
succinct	5	-02	-25	-44	41	100	32	06	-58	00	10	-34	82	65	43	37	-38	08	42	28	-13	63	20	24	-25	-62	44	00	-71	47
graceful	6	42	34	18	48	32	100	17	21	05	09	53	32	51	71	73	06	57	52	54	07	42	04	72	10	03	83	03	14	85
vigorous	7	05	-03	12	07	06	17	100	32	-12	49	-22	10	24	49	50	45	10	-11	67	45	08	26	43	57	-08	28	-14	30	24
lush	8	-03	25	28	-27	-58	21	32	100	-24	35	28	-43	-20	18	10	43	21	-33	39	46	-29	-29	32	62	32	17	-28	88	05
earnest	9	55	05	28	46	00	05	-12	-24	100	-28	24	14	-01	-16	-01	-01	-21	25	-30	-22	-03	39	-20	-21	11	-13	93	-18	-06
intimate	10	-23	-22	-19	-08	10	09	49	35	-28	100	-37	23	30	31	18	41	-03	-23	56	89	13	-16	31	67	-38	30	-36	19	13
elegant	11	54	55	49	29	-34	53	-22	28	24	-37	100	-35	-11	16	26	12	42	23	-06	-23	-13	00	23	-13	57	29	25	40	34
natural	12	00	-32	-41	42	82	32	10	-43	14	23	-35	100	64	43	34	-29	06	37	29	05	58	23	27	-13	-61	48	07	-62	43
clear	13	-06	-41	-46	50	65	51	24	-20	-01	30	-11	64	100	54	62	-08	01	65	50	11	86	15	37	-03	-61	58	-07	-33	60
interesting	14	30	24	04	51	43	71	49	18	-16	31	16	43	54	100	82	12	62	33	77	24	40	09	87	22	-12	87	-21	06	85
strong	15	37	21	06	60	37	73	50	10	-01	18	26	34	62	82	100	12	55	52	73	13	52	33	71	14	-03	79	-05	06	87
opinionated	16	21	16	43	-07	-38	06	45	43	-01	41	12	-29	-08	12	12	100	03	-23	19	56	-30	-02	23	56	14	07	-05	48	-03
original	17	44	68	30	26	08	57	10	21	-21	-03	42	06	01	62	55	03	100	12	42	03	02	00	66	03	43	62	-22	19	67
ordered	18	24	-10	-15	58	42	52	-11	-33	25	-23	23	37	65	33	52	-23	12	100	13	-32	71	22	25	-39	-20	43	20	-31	56
vivid	19	00	05	-10	19	28	54	67	39	-30	56	-06	29	50	77	73	19	42	13	100	50	42	02	69	56	-18	67	-34	29	63
personal	20	-17	-07	-03	-16	-13	07	45	46	-22	89	-23	05	11	24	13	56	03	-32	50	100	-03	-20	30	77	-19	23	-31	34	07
precise	21	-18	-43	-59	42	63	42	08	-29	-03	13	-13	58	86	40	52	-30	02	71	42	-03	100	17	23	-15	-53	46	-06	-39	53
masculine	22	27	-03	05	34	20	04	26	-29	39	-16	00	23	15	09	33	-02	00	22	02	-20	17	100	02	-21	06	03	41	-22	14
varied	23	33	38	19	41	24	72	43	32	-20	31	23	27	37	87	71	23	66	25	69	30	23	02	100	28	04	82	-24	23	78
emotional	24	-16	-01	08	-27	-25	10	57	62	-21	67	-13	-13	-03	22	14	56	03	-39	56	77	-15	-21	28	100	-06	17	-26	55	00
complex	25	47	68	65	-06	-62	03	-08	32	11	-38	57	-61	-61	-12	-03	14	43	-20	-18	-19	-53	06	04	-06	100	-12	14	52	-04
pleasant	26	29	23	02	54	44	83	28	17	-13	30	29	48	58	87	79	07	62	43	67	23	46	03	82	17	-12	100	-21	04	91
serious	27	54	09	29	38	00	03	-14	-28	93	-36	25	07	-07	-21	-05	-05	-22	20	-34	-31	-06	41	-24	-26	14	-21	100	-19	-10
florid	28	07	34	43	-29	-71	14	30	88	-18	19	40	-62	-33	06	06	48	19	-31	29	34	-39	-22	23	55	52	04	-19	100	-05
good	29	38	29	04	63	47	85	24	05	-06	13	34	43	60	85	87	-03	67	56	63	07	53	14	78	00	-04	91	-10	-05	100

one might not necessarily expect wordy-succinct and affected-natural to have a correlation as high as .82, as they actually did have, since these scales would at first glance seem to refer to different characteristics. Probably the judges would be surprised to learn that their ratings on these scales correlated so highly. Yet, in making these ratings the judges must have been responding to the same essential characteristics of the prose passages, whatever they may have been. It is the task of the factor analysis to elucidate these essential characteristics; indeed, the purpose of the factor analysis is to provide a way of summarizing the data shown in a correlation matrix.

Correlations Among the Objective Measures

The 741 different intercorrelations among the objective style measures are shown in Table 7; partly on account of their generally lower reliabilities the variables tend to have somewhat lower intercorrelations than the subjective measures. There are nevertheless a considerable number of significant intercorrelations, certainly enough to make factor analysis appropriate and desirable.

Correlations Between the Subjective and the Objective Measures

The 1131 different intercorrelations between the subjective and the objective measures are presented in Table 8. The data merit careful study, for it appears that many characteristics of prose passages which can be rated subjectively can also be measured objectively. This, of course, has been known for some time, for it provides the basis for the various systems for measuring "readability" and "human interest" which have been proposed by a number of investigators. We believe, however, that the present data are the most extensive available, and that only a study like the present one can approach a satisfactory delineation of the distinct dimensions which underlie the relationships between

TABLE 7

Intercorrelations Among the 39 Objective Measures of Style

N = 150 passages

(Decimal point omitted)

		no. paragraphs	no. syllables	no. sentences	s. d. of sentence length	no. clauses	clause complexity index	p. of noun clauses	p. of adj. clauses	p. of adverb clauses	p. of paren'l clauses	p. of action verbs	p. of cognitive verbs	p. of transitive verbs	p. intrans. verbs	p. copulas	p. Latin-Greek verbs	p. passive verbs	mean tense	entropy of tense	no. infinitives	no. participles	no. gerunds	no. proper nouns	no. common nouns	p. of unmod. common nouns	p. gillie nouns	no. of articles	p. indef. articles	no. personal pronouns	no. poss. pronouns	no. indef. pronouns	no. ind. and quantifying deters.	no. demons. pronouns	no. numerical expressions	no. prepositions	no. pronouns	no. determiners	no. descriptive adjectives	no. participial modifiers
		30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68
no. paragraphs	30	100	-12	52	-40	35	-32	10	-15	-03	-00	39	-09	10	05	-16	-09	-19	-04	10	01	-06	01	24	-00	22	-30	05	21	07	01	-05	-14	-05	13	-22	10	-10	-16	-11
no. syllables	31	-12	100	-26	-01	-64	10	-04	08	-10	-02	-46	-32	09	-29	11	56	47	24	03	-25	13	20	08	52	-49	60	02	-11	-70	-25	-27	28	00	10	36	-66	22	30	17
no. sentences	32	52	-26	100	-52	61	-59	17	-27	05	03	33	07	03	08	-10	-14	-22	-11	06	06	-24	06	12	-15	28	-33	03	22	29	05	05	-28	09	03	-32	28	-16	-16	-02
s. d. of sentence length	33	-40	-01	-52	100	-22	35	-06	-01	16	01	-17	13	-08	-06	13	-06	-01	04	05	-12	04	-00	-18	-03	-19	19	01	-19	-00	-06	03	04	16	-16	17	-05	-05	25	03
no. clauses	34	35	-64	61	-22	100	-21	32	-35	09	-03	42	28	-03	18	-10	-36	-48	-16	12	12	-29	-03	01	-54	46	-45	-18	23	70	22	21	-37	09	-14	-64	71	-25	-28	-20
clause complexity index	35	-32	10	-59	35	-21	100	04	09	-07	03	-35	08	01	-07	05	14	03	11	04	08	03	06	-18	-09	-25	35	-11	-20	03	14	02	10	-01	-10	04	04	12	-00	-07
p. of noun clauses	36	10	-04	17	-06	32	04	100	-56	-36	-05	-01	06	-08	-12	18	10	-17	-07	23	-01	-20	04	15	-30	14	02	-09	-07	22	-01	06	-11	09	-16	-21	18	-17	-13	-13
p. of adj. clauses	37	-15	08	-27	-01	-35	09	-56	100	-38	-21	-07	-10	-02	05	-00	-04	19	08	-18	-01	-01	-15	-07	28	-17	13	12	-04	-24	04	05	13	-08	05	28	-23	24	15	05
p. of adverb clauses	38	-03	-10	05	16	09	-07	-36	-38	100	-13	00	08	-08	12	-01	-05	-06	-05	-11	09	08	08	-20	-08	03	-07	-02	08	12	09	-02	-00	-00	05	-14	14	-08	01	07
p. of paren'l clauses	39	-00	-02	03	01	-03	03	-05	-21	-13	100	06	10	22	-10	-16	00	-00	-02	07	06	16	10	10	-01	-06	-00	-13	03	05	03	-07	-05	02	02	03	07	-01	-08	03
p. of action verbs	40	39	-46	33	-17	42	-35	-01	-07	-00	06	100	04	19	17	-35	-35	-21	-33	03	-04	11	-26	33	-13	46	-66	18	08	19	-06	00	-31	-22	27	-18	19	-17	-28	-15
p. of cognitive verbs	41	-09	-32	07	13	28	08	06	-10	08	10	04	100	-01	06	-04	-18	-26	-24	02	06	-12	-04	-04	-39	09	-15	-12	01	41	13	33	-16	13	-19	-16	40	-19	-10	-03
p. of transitive verbs	42	10	09	03	-08	-03	01	-08	-02	-08	22	19	-01	100	-42	-78	07	05	-02	19	-01	10	12	26	02	-02	00	04	-07	-01	-02	-20	03	-08	16	13	-02	04	-22	-14
p. of intrans verbs	43	05	-29	08	-06	18	-07	-12	05	12	-10	17	06	-42	100	-19	-15	-13	-15	-27	-05	12	-22	-07	-06	24	-27	04	07	11	14	08	-18	03	-07	-07	14	-14	-06	03
p. of copulas	44	-16	11	-10	13	-10	05	18	-00	-01	-16	-35	-04	-78	-19	100	05	05	12	-02	04	-21	00	-26	04	-13	18	-07	04	-04	-06	15	10	08	-14	-08	-07	05	31	13
p. of Latin-Greek verbs	45	-09	56	-14	-06	-36	14	10	-04	-05	00	-35	-18	07	-15	05	100	33	17	-03	-03	11	14	07	22	-32	49	-01	-09	-37	-07	-16	10	05	-02	19	-35	11	10	10
p. of passive verbs	46	-19	47	-22	-01	-48	03	-17	19	-06	-00	-21	-26	05	-13	05	33	100	11	-16	-34	13	14	-13	36	-12	31	21	-16	-56	-32	-17	24	00	06	34	-56	18	10	12
mean tense	47	-04	24	-11	04	-16	11	-07	08	-05	-02	-33	-24	-02	-15	12	17	11	100	15	12	-07	20	-30	25	-27	31	-15	-02	-18	-06	00	15	19	-06	00	-14	17	21	-10
entropy of tense	48	10	03	06	05	12	04	23	-18	-11	07	03	02	19	-27	-02	-03	-16	15	100	02	00	-02	24	-15	-03	02	-10	02	08	-08	-00	00	11	02	-16	09	03	-10	-14
no. infinitives	49	01	-25	06	-12	12	08	-01	-01	09	06	-04	06	-01	-05	04	-03	-34	12	02	100	-18	14	-25	-08	01	05	-21	04	28	15	09	-08	01	-04	-12	25	-04	-20	-10
no. participles	50	-06	13	-24	04	-29	03	-20	-01	08	16	11	-12	10	12	-21	11	13	-07	00	-18	100	-18	09	19	-00	-11	02	06	-21	-17	-09	10	-15	20	11	-22	06	-02	08
no. gerunds	51	01	20	06	-00	-03	06	04	-15	08	10	-26	-04	12	-22	00	14	14	20	-02	14	-18	100	-24	08	-12	27	-02	00	-01	01	-16	-03	00	04	11	-04	-04	06	-03
no. proper nouns	52	24	08	12	-18	01	-18	15	-07	-20	10	33	-04	26	-07	-26	07	-13	-30	24	-25	09	-24	100	-22	08	-14	12	-11	-09	-07	-07	-12	-16	21	01	-06	-06	-20	-02
no. common nouns	53	-00	52	-15	-03	-54	-09	-30	28	-08	-01	-13	-39	02	-06	04	22	36	25	-15	-08	19	08	-22	100	-23	17	21	08	-68	-17	-27	22	-13	10	41	-65	14	26	15
p. of unmod. common nouns	54	22	-49	28	-19	46	-25	14	-17	03	-06	46	09	-02	24	-13	-32	-12	-27	-03	01	-00	-12	08	-23	100	-47	30	-14	31	-05	05	-18	-10	-12	-24	26	-25	-36	-20
p. of gillie nouns	55	-30	60	-33	19	-45	35	02	13	-07	00	-66	-15	00	-27	18	49	31	31	02	05	-11	27	-14	17	-47	100	-08	-18	-28	06	-13	18	13	-20	29	-25	07	23	07
no. of articles	56	05	02	03	01	-18	-11	-09	12	-02	-13	18	-12	04	04	-07	-01	21	-15	-10	-21	02	-02	12	21	30	-08	100	-19	-31	-33	-12	-04	-17	04	29	-41	-09	02	01
p. of indef. articles	57	21	-11	22	-19	23	-20	-07	-04	08	03	08	01	-07	07	04	-09	-16	-02	02	04	06	00	-11	08	-14	-18	-19	100	12	15	00	-14	-09	09	-16	14	-09	02	10
no. personal pronouns	58	07	-70	29	-00	70	03	22	-24	12	05	19	41	-01	11	-04	-37	-56	-18	08	28	-21	-01	-09	-68	31	-28	-31	12	100	44	30	-30	04	-15	-48	91	-25	-25	-16
no. poss. pronouns	59	01	-25	05	-06	22	14	-01	04	09	03	-06	13	-02	14	-06	-07	-32	-06	-08	15	-17	01	-07	-17	-05	06	-33	15	44	100	07	-17	-06	-10	-14	58	-13	-13	01
no. indef. pronouns	60	-05	-27	05	03	21	02	06	05	-02	-07	00	33	-20	08	15	-16	-17	00	-00	09	-09	-16	-07	-27	05	-13	-12	00	30	07	100	-00	16	-11	-19	34	-00	-05	-24
no. indef. and quant.determ.	61	-14	28	-28	04	-37	10	-11	13	-00	-05	-31	-16	03	-18	10	10	24	15	00	-08	10	-03	-12	22	-18	18	-04	-14	-30	-17	-00	100	06	02	12	-29	62	16	-03
no. demons. pronouns	62	-05	00	09	16	09	-01	09	-08	-00	02	-22	13	-08	03	08	05	00	19	11	01	-15	00	-16	-13	-10	13	-17	-09	04	-06	16	06	100	-25	03	07	30	03	-13
no. numerical expressions	63	13	10	03	-16	-14	-10	-16	05	05	02	27	-19	16	-07	-14	-02	06	-06	02	-04	20	04	21	10	-12	-20	04	09	-15	-10	-11	02	-25	100	01	-21	47	-17	-05
no. prepositions	64	-22	36	-32	17	-64	04	-21	28	-14	03	-18	-16	13	-07	-08	19	34	00	-16	-12	11	11	01	41	-24	29	29	-16	-48	-14	-19	12	03	01	100	-51	08	17	15
no. pronouns	65	10	-66	28	-05	71	04	18	-23	14	07	19	40	-02	14	-07	-35	-56	-14	09	25	-22	-04	-06	-65	26	-25	-41	14	91	58	34	-29	07	-21	-51	100	-25	-32	-23
no. determiners	66	-10	22	-16	-05	-25	12	-17	24	-08	-01	-17	-19	04	-14	05	11	18	17	03	-04	06	-04	-06	14	-25	07	-09	-09	-25	-13	-00	62	30	47	08	-25	100	-02	-12
no. descriptive adjectives	67	-16	30	-16	29	-28	-06	-13	15	01	-08	-28	-10	-22	-06	31	10	10	21	-10	-20	-02	06	-20	26	-36	23	02	02	-25	-13	-05	16	03	-17	17	-32	-02	100	25
no. participial modifiers	68	-11	17	-02	03	-20	-07	-13	05	07	03	-15	-03	-14	03	13	10	12	-10	-14	-10	08	-03	-02	15	-20	07	01	10	-16	01	-24	-03	-13	-05	15	-23	-12	25	100

TABLE 8

Intercorrelations between Subjective and Objective Measures of Style

N = 150 passages

(Decimal point omitted)

Positive end of scale		no. paragraphs	no. syllables	no. sentences	s. d. of sentence length	no. clauses	clause complexity index	p. of noun clauses	p. of adj. clauses	p. of adverb clauses	p. of parent'l clauses	p. of action verbs	p. of cognitive verbs	p. of transitive verbs	p. of intrans. verbs	p. of copulas	p. of Latin-Greek verbs	p. passive verbs	mean tense	entropy of tense	no. infinitives
		30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
profound	1	-30	15	-16	21	-09	23	22	-01	-10	-04	-44	08	-13	-18	26	16	08	15	-09	06
subtle	2	-24	-02	-14	16	05	15	14	04	-11	-05	-28	23	-18	00	19	03	-02	02	-09	-00
abstract	3	-24	05	-12	25	01	28	19	01	-08	-05	-51	16	-22	-08	30	07	01	23	00	06
meaningful	4	-15	17	-10	06	-12	10	12	-11	-04	03	-12	-04	01	-19	09	15	12	02	-08	03
succinct	5	36	-15	42	-38	27	-36	14	-23	02	-02	40	-17	19	-07	-18	-11	-10	-22	-03	10
graceful	6	-08	-16	05	15	03	-11	-01	03	-00	-05	08	14	-06	-05	08	-10	-10	-16	-14	-02
vigorous	7	-01	-35	18	14	22	-04	15	-10	09	-05	00	24	-07	00	05	-16	-30	-15	-00	13
lush	8	-22	-28	-16	39	02	12	-13	17	07	-07	-03	34	-31	23	19	-19	-21	-03	-00	-10
earnest	9	-19	27	-19	07	-32	19	-02	13	-12	06	-32	-08	01	-16	09	25	26	12	-22	09
intimate	10	10	-62	23	05	41	-04	07	-11	09	06	27	39	-06	19	-05	-42	-51	-14	08	15
elegant	11	-35	27	-36	32	-34	22	-10	18	-10	03	-36	-02	-08	-12	17	23	20	13	-13	-10
natural	12	23	-22	31	-20	22	-26	09	-17	01	-01	37	-06	12	-06	-09	-16	-13	-22	-07	08
clear	13	10	-14	17	-09	05	-18	-00	-13	08	03	27	-00	19	-12	-15	-10	-07	-14	-00	05
interesting	14	-03	-35	16	09	25	-09	14	-16	07	-01	17	20	-08	00	07	-22	-22	-27	-09	03
strong	15	-11	-20	02	13	09	-08	05	-12	07	-02	06	18	09	-11	-06	-09	-12	-12	-08	02
opinionated	16	-16	-19	-05	28	10	25	06	-00	02	03	-29	20	-15	02	16	-09	-24	28	08	09
original	17	-16	-24	-05	24	16	-05	06	-04	01	-05	05	16	-11	03	08	-15	-12	-16	-10	-01
ordered	18	-02	18	-06	-05	-17	-01	-07	-06	06	05	00	-15	20	-18	-10	17	18	01	-15	-01
vivid	19	00	-56	26	10	37	-24	01	-14	14	01	37	34	-03	14	-08	-33	-32	-31	-08	01
personal	20	00	-60	11	14	34	06	01	-07	10	10	18	45	-10	20	-02	-39	-48	-12	05	10
precise	21	11	-03	11	-11	-03	-25	-12	-12	15	05	30	-06	20	-07	-19	-03	01	-21	-12	-01
masculine	22	-18	22	-14	07	-23	02	07	05	-11	-03	-20	-10	14	-23	-01	20	10	01	-09	03
varied	23	-05	-35	13	11	21	-05	10	-06	03	-05	12	21	-20	09	14	-19	-19	-18	-15	02
emotional	24	05	-58	14	19	31	01	-05	-01	14	01	21	44	-17	27	-00	-35	-39	-18	-01	02
complex	25	-43	24	-41	33	-28	25	-07	15	-02	00	-45	06	-17	-01	19	17	12	14	-11	-06
pleasant	26	-02	-32	10	10	23	-07	01	-11	10	-02	20	15	-06	02	04	-22	-25	-21	-07	01
serious	27	-17	34	-18	03	-37	18	01	18	-20	04	-34	-11	00	-17	11	28	27	10	-11	11
florid	28	-30	-16	-23	38	-08	16	-17	19	09	-04	-20	26	-31	22	18	-07	-08	02	-09	-09
good	29	-08	-22	04	10	12	-10	04	-11	04	-00	12	13	02	-08	00	-13	-12	-17	-11	01

Positive end of scale		no. participles	no. gerunds	no. proper nouns	no. common nouns	p. of unmod. common nouns	p. of gillie nouns	no. articles	p. indef. articles	no. personal pronouns	no. poss. pronouns	no. indef. pronouns	no. indef. and quantifying determ.	no. demonstrative pronouns	no. numerical expressions	no. prepositions	no. pronouns	no. determiners	no. descriptive adjectives	no. participial modifiers
		50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68
profound	1	-18	12	-23	-03	-14	40	03	-18	03	-07	22	17	12	-35	12	-04	-01	26	01
subtle	2	-23	-01	-15	-12	-02	19	02	03	19	03	20	-03	04	-35	10	12	-20	19	03
abstract	3	-37	16	-31	-14	-21	42	-13	-07	20	15	27	08	24	-43	08	17	-06	30	05
meaningful	4	11	17	-03	07	-02	14	19	-13	-11	-26	03	18	-07	-05	03	-20	04	09	-01
succinct	5	03	08	22	-03	35	-36	23	05	06	-20	-01	-09	-23	27	-20	-00	-07	-30	-17
graceful	6	-03	03	02	-04	10	-06	23	04	13	-02	12	-17	-12	-09	11	02	-26	21	11
vigorous	7	-17	-05	03	-28	06	-07	-09	-11	41	21	09	-16	02	-13	-21	33	-13	-13	13
lush	8	-05	-18	-11	-11	-11	-07	-05	09	24	22	14	-17	00	-20	00	21	-20	35	29
earnest	9	-00	12	-14	07	-11	39	02	-33	-23	-12	14	28	16	-09	22	-20	21	12	03
intimate	10	-03	-18	00	-42	13	-41	-16	14	58	22	18	-20	-03	03	-42	52	-09	-17	03
elegant	11	-06	11	-06	13	-28	45	08	-07	-17	00	02	06	-07	-17	38	-21	-09	45	14
natural	12	08	05	10	-04	30	-39	21	02	08	-17	09	-11	-11	28	-15	-00	00	-27	-09
clear	13	19	10	13	-01	12	-20	14	04	06	-08	-10	-11	-18	19	-08	-00	-09	-11	-03
interesting	14	-07	-02	04	-23	20	-20	17	06	34	03	15	-20	-13	-06	-17	20	-24	00	07
strong	15	03	06	03	-12	11	-08	13	-03	19	-05	04	-09	-10	-09	00	08	-16	03	02
opinionated	16	-32	00	-23	-16	-24	17	-29	04	32	32	19	-02	22	-25	-16	29	-01	20	03
original	17	-05	-05	-03	-12	12	-13	14	13	20	-04	13	-15	-06	-15	01	09	-24	09	02
ordered	18	23	22	-02	15	05	09	25	-04	-18	-15	-17	01	-07	04	14	-20	-00	05	02
vivid	19	00	-15	10	-32	27	-41	05	05	45	09	11	-30	-12	-08	-26	37	-31	-06	08
personal	20	-08	-14	-06	-42	09	-34	-25	14	61	32	21	-13	01	-01	-36	55	-07	-10	00
precise	21	29	04	18	08	14	-24	18	05	-08	-15	-21	-12	-20	25	-00	-11	-07	-11	01
masculine	22	-01	-03	06	08	-10	22	02	-33	-17	-12	04	23	04	04	21	-20	26	-05	-04
varied	23	-08	-03	-03	-18	12	-18	12	16	35	12	20	-24	-09	-10	-08	20	-27	08	08
emotional	24	-12	-22	00	-37	11	-31	-15	00	48	27	21	-19	04	-13	-25	45	-16	-02	08
complex	25	-01	-01	-19	05	-26	42	-08	-07	-09	04	06	12	09	-34	27	-08	-04	31	13
pleasant	26	02	-01	02	-18	18	-25	19	09	31	-01	15	-22	-18	-03	-14	16	-25	07	06
serious	27	-04	10	-08	09	-14	43	04	-34	-28	-09	07	25	13	-10	27	-24	17	11	04
florid	28	-05	-16	-15	-08	-21	11	-08	00	17	26	09	-11	02	-27	11	15	-16	36	31
good	29	04	07	03	-10	17	-14	22	07	18	-08	05	-14	-17	-05	-02	05	-23	07	05

subjective and objective measures of style.

The Factor Analysis

The 2278 different intercorrelations among all 29 subjective and 39 objective measures taken together were considered as constituting a single matrix and subjected to a multiple factor analysis by the centroid method of Thurstone (1947). The analysis was performed by means of a high-speed electronic computing machine; the highest correlation in each array was used as the initial estimate of communality for the corresponding variable. After seven centroid factors were extracted, the residual correlations were clearly of a nearly random character and it was decided to stop extracting factors. The seven factors accounted for 53.8% of the total variance; the remaining 46.2% is judged to be mainly variance due to unreliability, in view of the fact that most of the communalities approach the reliabilities fairly closely. The resulting centroid factor matrix is presented as Table 9 (not included in this provisional version of the paper), together with communalities and data on the proportion of variance extracted with each factor.

The factors were rotated to simple structure by the biquartimin solution, a method developed and programmed for high-speed computing machines by the writer (1957). Since this method is completely analytical, it was not necessary to make any subjective judgments in arriving at the final rotated factor matrix presented as Table 10. (Before the recent introduction of analytical methods of rotation, factor analysis was the target of criticism to the effect that the concept of simple structure was not objectively defined.)

The first four factors in Table 10 are clearly distinct and meaningful. Of the last three factors, two are nearly duplicates of each other (perhaps resulting from a possible technical failure in applying the biquartimin solution) and none is clearly interpretable. The first four factors, however, appear to

Appendix B

Table 10

Rotated Factor Matrix

		(Eval) A	(Pers) B	(Ser) C	(Orn) D	(?) E	(?) E'	(?) F
profound	1	.403	.036	.578	.120	-.034	-.027	-.070
subtle	2	.284	-.014	.157	.221	-.099	-.098	-.078
abstract	3	.068	.196	.363	.330	.011	.010	-.066
meaningful	4	.611	-.101	.386	-.106	.023	.024	.022
succinct	5	.381	-.031	.029	-.719	.013	.016	-.048
graceful	6	.865	-.089	-.024	.056	.052	.051	-.043
vigorous	7	.268	.374	.217	.218	-.215	-.202	.042
lush	8	.149	.098	-.183	.612	-.007	.007	-.139
earnest	9	-.047	-.009	.717	-.047	.017	.036	-.111
intimate	10	.096	.593	-.019	.073	.019	.033	-.068
elegant	11	.422	-.263	.018	.467	.010	-.006	.111
natural	12	.360	.029	.171	-.599	.034	.052	-.151
clear	13	.627	.052	-.086	-.196	.086	.072	.172
interesting	14	.850	.098	.046	-.024	-.077	-.069	-.052
strong	15	.864	.055	.092	.106	-.059	-.065	-.113
opinionated	16	.031	.478	.142	.461	.113	.111	.02[illegible]
original	17	.620	-.038	-.051	.095	-.060	-.057	-.092
ordered	18	.579	-.186	-.033	-.129	.190	.165	.177
vivid	19	.638	.232	-.056	.082	-.148	-.134	-.039
personal	20	.050	.614	-.010	.219	.041	.053	-.060
precise	21	.564	-.121	-.171	-.233	.070	.056	.172
masculine	22	.130	-.072	.514	.004	-.188	-.175	.055
varied	23	.792	.089	-.027	.076	-.009	-.001	-.112
emotional	24	.020	.436	.010	.297	-.099	-.073	-.158
complex	25	.023	-.154	.121	.554	-.100	-.106	.048
pleasant	26	.896	.075	-.088	-.027	.064	.061	-.027
serious	27	-.095	-.074	.713	-.041	-.063	-.045	-.079
florid	28	.088	.043	-.153	.730	-.036	-.028	-.063
good	29	.948	-.043	-.027	-.037	.014	.007	.036
no. paragraphs	30	-.121	.057	-.256	-.478	.014	.008	-.021
no. syllables	31	-.103	-.520	.039	.208	-.092	-.117	.294
no. sentences	32	.008	.195	-.145	-.546	.000	.002	-.111
s.d. sent. length	33	.167	.001	.144	.536	-.070	-.065	.049
no. clauses	34	-.009	.580	-.111	-.434	.022	.020	-.096
clause compl index	35	-.072	.191	.200	.436	.010	-.005	.209
p noun clauses	36	-.027	.139	.233	-.128	-.450	-.453	.173
p adj. clauses	37	-.108	-.242	.027	.112	.247	.272	-.306
p adv. clauses	38	.107	.146	-.206	.039	.294	.281	.002
p paren. clauses	39	-.015	.070	-.055	.097	-.147	-.169	.281

Table 10 (cont.)

		(Eval)	(Pers)	(Ser)	(Orn)	(?)	(?)	(?)
		A	B	C	D	E	E'	F
p action verbs	40	.050	-.009	-.301	-.428	-.139	-.124	-.108
p cog. verbs	41	.081	.386	.120	.162	-.146	-.141	.025
p trans verbs	42	-.037	.067	-.153	.017	-.234	-.282	.603
p intrans. verbs	43	-.091	.029	-.127	-.074	.124	.152	-.344
p copulas	44	.068	-.082	.230	.070	.182	.211	-.377
p Lat Gk verbs	45	-.065	-.230	.089	.177	-.123	-.147	.292
p passive verbs	46	-.061	-.556	.102	.018	.020	.032	-.096
mean tense	47	-.140	.071	.000	.124	.309	.288	.065
entropy tense	48	-.162	.162	-.040	.033	-.174	-.194	.262
no. infinitives	49	-.012	.391	.069	-.068	.211	.196	.056
no. participles	50	.079	-.232	-.202	.069	-.006	-.016	.146
no. gerunds	51	.100	.077	-.030	.001	.144	.111	.229
no. proper nouns	52	-.031	-.359	-.079	-.058	-.507	-.510	.261
no. common nouns	53	.000	-.553	-.198	.039	.225	.221	-.055
p unmod. com. nns.	54	.045	.044	.055	-.485	-.141	-.110	-.282
p gillie nouns	55	-.059	-.079	.250	.437	-.028	-.058	.318
no. articles	56	.194	-.488	.016	-.216	-.133	-.103	-.245
p indef. arts.	57	.108	.100	-.460	-.055	.267	.242	.053
no. pers. prnns.	58	.107	.804	.017	-.032	.014	.002	.069
no. poss. prnns.	59	-.042	.452	-.147	.210	.084	.059	.175
no. indef. prnns.	60	-.018	.316	.306	-.107	.084	.110	-.288
no. ind. qnt. dtr.	61	-.153	-.176	.285	.016	.196	.214	-.177
no. demons. prnns.	62	-.206	.175	.261	-.012	.073	.084	-.127
no. numer. exps.	63	-.062	-.130	-.234	-.197	.192	.187	.009
no. prepositions	64	.048	-.528	.052	.237	-.112	-.108	.038
no. pronouns	65	-.021	.866	-.027	-.042	.071	.050	.118
no. determiners	66	-.274	-.046	.219	-.101	.351	.369	-.224
no. descr. adjs.	67	.187	-.278	-.039	.351	.149	.153	-.107
no. prtcp. mods.	68	.161	-.249	-.131	.293	-.081	-.080	.033

Table 11
Transformation Matrix

	A	B	C	D	E	E'	F
I	.391	.482	-.243	-.320	-.064	-.069	.047
II	.279	.397	.281	.546	.037	.049	-.145
III	.804	-.411	.219	.021	-.207	-.215	.172
IV	.261	-.440	-.448	.313	.288	.314	-.308
V	-.026	.448	.350	.226	.246	.235	.207
VI	.089	.068	.127	-.609	.800	.831	-.682
VII	.210	.200	-.688	.277	.407	.318	.585

account for a very large part of the common factor variance of all the 68 measures, and may be regarded as being probably the most basic and pervasive factors of style. Further studies may turn up new factors, but these new factors will doubtless be of relatively small extent and applications.

Perhaps it should be said at this point that the results do not support any clear distinction between content and style, i.e., separate factors for content and style were not found, but rather, the factors cut across the boundaries ordinarily assumed for content and style. We were already aware that this might be the case when we received reports from our judges that they had extreme difficulty in separating content from style.

In what follows, we will attempt to present the several factors of "style" (or "style-content") which were isolated. As is customary, a list of the variables having highest loadings* on each of the factors will be presented, and an attempt will be made to "interpret" or to "name" the factor in question. The process of interpretation is essentially one of trying to arrive at the most generalized conceptualization of the factor possible, a conceptualization which will nevertheless have utility in predicting what kinds of new measures would be correlated with the factor. The interpretation of a factor is tantamount to a hypothesis which can be tested in further studies.

For purposes of interpretation, loadings of .30 or greater in absolute magnitude will be considered significant. (This restriction will be relaxed somewhat, however, in attempting to interpret the dubious factors.) When the loading is given with a negative sign, it means that the *reverse* of the variable in question is correlated with the factor, or in the case of such variables as

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*A loading is a coefficient which can be interpreted like a correlation between a variable and an underlying factor; it is not actually a correlation, however.

"number of nouns", "proportion of action verbs", and other measures of frequency, *low* relative frequencies or proportions are associated with *high* values of the factor in question.

Factor A (General Stylistic Evaluation?)

In order of magnitude of their loadings, the following variables appear significantly on Factor A:

good (vs. bad)	.948
pleasant (vs. unpleasant)	.896
graceful (vs. awkward)	.865
strong (vs. weak)	.864
interesting (vs. boring)	.850
varied (vs. monotonous)	.792
vivid (vs. pale)	.638
clear (vs. hazy)	.627
original (vs. trite)	.620
meaningful (vs. meaningless)	.611
ordered (vs. chaotic)	.579
precise (vs. vague)	.564
elegant (vs. uncouth)	.422
profound (vs. superficial)	.403
succinct (vs. wordy)	.381
natural (vs. affected)	.360

The common element in the variables which have high loadings on factor A is that they are *evaluative*; they represent a number of superficially different ways of saying that the style of a passage is *good* or *bad*. If a passage is rated *good*, it is also highly likely to be rated *pleasant*; if it is rated *pleasant*, it is also likely to be rated *graceful*, *strong*, *interesting*, etc. Any discrimination among these terms would presumably be expected to show up in differential loadings on other factors, but the interesting thing is that with minor exceptions the scales listed above *do not appear loaded on other factors*. As applied to English prose passages, the terms *good*, *pleasant*, *graceful*, *strong*, *interesting*, *varied*, *clear*, *original*, *ordered*, and *precise* (and their opposites) are virtually equivalent in meaning. The terms *vivid*, *meaningful*, *elegant*, *profound*, *succinct*, and natural all have an evaluative meaning, but as will be seen below, carry additional semantic freight as indicated by significant or nearly significant loadings on other factors.

It should be borne in mind that the results are for the averaged ratings of eight judges. It is conceivable that individual judges observed certain distinctions among the terms which might have been reflected in different factor patterns had a separate factor analysis been made of the ratings of each judge. It would be interesting to perform such analyses in order to compare the bases of judgment used by the several raters; yet, any differential patterning would be highly idiosyncratic and of little use in drawing generalizations about style. Our results indicate a common basis on which the judges are able to agree concerning the meaning and application of a series of adjectival scales.

All the significant loadings above are for the purely subjective measures of style. Apparently there are no objective measures, at least among those studied here, which give any significant clue to the overall evaluation of prose style. One is somewhat gratified to learn this, for if style is truly a matter of artistic creation it will be very difficult to identify purely mechanical measures of style, much less to generate good style mechanically. There are, to be sure, a handful of objective measures whose loadings on the evaluative factor approach significance:

Number of determiners	-.274
Number of demonstrative pronouns	-.206
Number of articles	.194
Number of descriptive adjectives	.137

It is difficult, however, to make any particular sense out of these loadings; it is quite likely that they reflect merely incidental associations between subjective and objective measures.

The results are of interest quite as much for what variables do not appear on the evaluative factor as for what variables do appear. In interpreting a factor, it is well to assure onesself that one's interpretation adequately accounts for the non-significant loadings as well as the significant ones. The subjective ratings which have non-significant loadings on this factor are as follows:

lush (vs. austere)	.149
masculine (vs. feminine)	.130
intimate (vs. remote)	.096
serious (vs. humorous)	-.095
florid (vs. plain)	.088
abstract (vs. concrete)	.068
personal (vs. impersonal).	.050
earnest (vs. flippant)	-.047
opinionated (vs. impartial). . . .	.031
complex (vs. simple)	.023
emotional (vs. rational)	.020

Even though some of these adjectives may appear to have evaluative overtones, we trust the reader will agree that *as applied to samples of literary style* they are on the whole neutral in evaluative content. Thus, the evaluation of literary style seems to be quite independent of whether the passage being evaluated is *lush* or *austere*, *masculine* or *feminine*, *intimate* or *remote*, etc. Of course, the obtaining of non-significant loadings for some of these terms may betoken the presence of what the statistician would call a non-linear relationship; that is, it is conceivable that good style is that which is neither *lush* nor *austere*, neither *masculine* nor *feminine*, neither *intimate* nor *remote*. The presence of non-linear relationships is not detected by conventional factor analysis techniques, and there has not yet been an opportunity to search for them in the present instance.

Factor B (Personal Appeal)

Almost completely independent of Factor A (the correlation is only .16) is Factor B, which has the following significant loadings:

Number of pronouns	.866
Number of personal pronouns	.804
Personal (vs. impersonal).	.614
Intimate (vs. remote).	.593
Number of clauses	.580
Proportion of passive verbs . . .	-.556
Number of common nouns	-.553
Number of prepositions	-.528
Number of syllables	-.520
Number of articles	-.488
Opionionated (vs. impartial) . . .	.478
Number of possessive pronouns . .	.452
Emotional (vs. rational)	.436
Number of infinitives	.391
Proportion of "cognitive" verbs ..	.386
Vigorous (vs. placid)	.374
Number of indefinite pronouns . .	.316

At once it is evident that this factor represents the extent to which a prose passage has what may be termed Personal Appeal. It is closely similar to the "human interest" aspect of style for which Flesch (1949, 1950) has developed measures. If anything, it can be measured objectively better than it can be rated subjectively, for the variables with the two highest loadings are objective measures. (It should be mentioned, however, that these loadings are somewhat spuriously inflated by the fact that one of the measures is contained in the other; it was through an oversight that both of these measures were included.) It is debatable whether Factor B is really a factor of style; it could be argued that it refers to content rather than style, and that the "personal appeal" or "human interest" of a passage is chiefly a matter of what is being written about. While this argument is not wholely without merit, it is probably inaccurate. Subject-matter can be held constant while personal appeal varies. Every writer for popular magazines knows very well a number of techniques for maintaining the reader's interest even in an ordinarily dull topic. If such a writer were to profit from the present study, he would use a large number of pronouns, keep his clauses short, avoid passive verbs, substitute pronouns for nouns wherever possible, eschew prepositional phrases, and use short words, few articles (either definite or indefinite) and many infinitives and "cognitive" verbs.

Factor C (Seriousness)

Independent of Factor A (-.065 is the correlation) but significantly negatively correlated with Factor B (-.364) is Factor C with the following highly loaded variables:

earnest (vs. flippant)	.717
serious (vs. humorous)	.713
profound (vs. superficial)	.578
masculine (vs. feminine)	.514
proportion of indefinite articles.	-.460
meaningful (vs. meaningless) . . .	.386
abstract (vs. concrete)	.363
number of indefinite pronouns. . .	.306
proportion of "action" verbs . . .	-.301

We identify this factor as a dimension of "seriousness". It may refer either to content or to style: the seriousness and importance of the subject-matter, or the seriousness and earnestness with which the subject-matter is treated. Writing in a light, humorous, or flippant vein produces low scores on this factor. While this factor is best assessed by subjective means, there are several objective measures which correlate very substantially with it, as indicated above. The use of a large number of definite articles (the) relative to the number of indefinite articles (a), and the use of a large number of indefinite pronouns (one, somebody, etc.) seem to be associated with seriousness, according to these results, and there are a number of other such measures with nearly significant loadings, as the reader can see by searching column C of Table 10.

Factor D (Ornamentation)

Factor D is almost completely independent of the preceding factors (the correlations with Factors A, B, and C are -.120, .021, and .120 respectively) and has the following variables with high loadings:

florid (vs. plain)	.730
wordy (vs. succinct)	.719
lush (vs. austere)	.612
affected (vs. natural)	.599
complex (vs. simple)	.554
Number of sentences in 300 words	-.546
Standard deviation of sentence length	.536
Proportion of common nouns which are preceded by the and otherwise unmodified	-.485
Number of paragraphs started in 300 words	-.478
elegant (vs. uncouth)	.467
opinionated (vs. impartial)	.461
Proportion of nouns ending in Gillie's suffixes	.437
Clause complexity index	.436
Number of clauses in 300 words	-.434
Proportion of "action" verbs	-.428
Number of descriptive adjectives	.351
abstract (vs. concrete)	.330
emotional (vs. rational)	.297

We call Factor D Ornamentation because it seems to represent that dimension of prose style which ranges from a plain, austere, simple, unornamented, succinct kind of writing to a florid, wordy, lush, complex, and highly ornamented kind of writing. Coincidentally, ornamented writing is regarded as elegant when it is also good, but as uncouth when it is also bad, as shown by the loadings of elegant on both Factors A and D. Likewise, ornamented writing is regarded as opinionated and emotional when it is also personal (with loadings on Factor B), but impartial and rational when it is impersonal.

There are numerous objective measures of ornamentation: the use of long sentences, the use of varied sentence length, the use of many noun modifiers, the use of complex clause structures, the use of nouns ending in abstraction-forming suffixes, and the use of many descriptive adjectives. Boder's adjective-verb quotient (1940) is probably in the main a measure of ornamentation.

Factors E (Interpretation doubtful) and E'

Factor E was found to be highly similar to another factor, called Factor E'; hence, the higher loadings of both these factors are reported below. Because of the paucity of high loadings, loadings of .20 or greater are listed.

	E	E'
Number of proper nouns	-.507	-.510
Proportion of noun clauses	-.450	-.453
Number of determiners	.351	.369
Mean tense	.309	.288
Proportion of adverbial clauses. . .	.294	.281
Proportion of indefinite articles.	.267	.242
Proportion of adjectival clauses .	.247	.272
Proportion of transitive verbs . .	-.234	-.282
Number of common nouns	.225	.221
placid (vs. vigorous)	.215	.202
Number of infinitives	.211	.196
Number of indefinite and quantifying determiners	.196	.214
Proportion of copulas	.182	.211
. . . .		
pale (vs. vivid)	.148	.134

It is probably extremely dangerous even to attempt to interpret this factor, on account of the generally low size of the loadings. What kind of writing would have a low number of proper nouns, a low proportion of noun clauses, a high number of determiners, and generally present or future tense rather than past? Certainly it would be relatively colorless and pale. The scale *placid-vigorous* makes a mild appearance on this factor, and also the scale *pale-vivid*, though with a loading so low that it is of dubious significance. There is a dim possibility, nevertheless, that this factor represents a dimension of colorlessness which is independent of and different from Factor D, Ornamentation. The presence on this factor of such variables as the Proportion of indefinite articles and the Number of indefinite and quantifying determiners lends support to such an interpretation. Any interpretation whatsoever, however, must be advanced with much caution and we are probably wise to leave the matter for further investigation.

Factor F (Interpretation dubious)

Factor F has the following loadings greater than .20:

Proportion of transitive verbs	.603
Proportion of copulas	-.377
Proportion of intransitive verbs	-.344
Proportion of nouns with Gillie's suffixes	.318
Proportion of adjective clauses	-.306
Number of syllables	.294
Proportion of Latin-Greek derived verbs	.292
Number of indefinite pronouns	-.288
Proportion of unmodified common nouns	-.282
Proportion of parenthetical clauses	.281
Entropy of tense	.262
Number of proper nouns	.261
Number of articles	-.245
Number of gerunds	.229
Number of determiners	-.224
Clause complexity index	.209

It is quite possible that this factor is largely artifactual. Since the proportions of transitive and intransitive verbs and of copulas are figured from the common base of all verbs, they can hardly vary with complete independence, and it is in fact inevitable that at least one inverse relationship will exist. This fact undoubtedly explains the presence of the first three variables at the top of the list above, transitive verbs varying inversely with copulas and with intransitive verbs. Yet, the presence of transitive verbs is evidently correlated with several other variables where the relationships cannot be spurious: for example, with the presence of nouns with Gillie's suffixes, with the presence of adjective clauses, and so on. At the moment, however, it is difficult to derive any meaningful interpretation from these findings, and as in the case of Factor E it is probably wise to leave the factor uninterpreted.

DISCUSSION

It is sometimes said of factor analysis studies that one gets out of them only what one puts into them, the implication being that such studies rarely do more than confirm obvious clusterings of variables. In the present case, the writer feels that his original hypotheses were considerably knocked about by the data. It will be recalled that in embarking on the study the writer set forth seven hypothetical dimensions of style, that is, those indicated in Table 2. It is interesting to notice what happened to these hypothesized dimensions:

1. Aesthetic quality: Three of the scales covered here, graceful-awkward, bad-good, and pleasant-unpleasant, appeared as virtually pure measures of Factor A, General Stylistic Evaluation. The hypothesis of a dimension of aesthetic quality was therefore in some measure confirmed, but it was too specific, since Factor A incorporated scales from several other hypothesized dimensions. The scale uncouth-elegant was found to be a composite of Factor A, General Stylistic Evaluation, and Factor D, Ornamentation. That is, to say that a passage is elegant is to say that it is both stylistically good and ornamented.

2. Communicativeness. The hypothesis of a factor of communicativeness was not confirmed. All the scales hypothesized for such a factor turned out to be measures of Factor A, General Stylistic Evaluation. One scale, succinct-wordy, had a supplementary negative loading on Factor D, Ornamentation, i.e., succinctness leads to good style but to a low degree of ornamentation. The remaining scales, chaotic-ordered, clear-hazy, and vague-precise, proved to be simply variant ways of evaluating the general style of a passage. Apparently our judges equated good style with orderedness, clarity, and precision. Good style communicates, if it does nothing else.

3. Variety. This hypothesized dimension seems to correspond to a considerable extent to Factor D, Ornamentation, on which three of the scales originally

assigned to variety were found: *florid-plain*, *lush-austere*, and *complex-simple*. The other three scales originally assigned here wound up on Factor A, General Stylistic Evaluation: *interesting-boring*, *original-trite*, and *monotonous-varied*, these three scales representing, evidently, further characteristics of "good" style. It is noteworthy that on the whole the judges did not distinguish between clarity and variety. (At least, this is the conclusion to be drawn from the factor analysis results; a closer inspection of the actual correlations, however, suggests that the judges did distinguish between clarity and variety, and further suggests that the factor rotations were not as satisfactorily accomplished by the analytical criterion as might be desired. For this reason, certain aspects of the present analysis must still be regarded as tentative.)

4. *Vigor*. This hypothesis failed to be confirmed. Of the scales originally set forth, two (*vivid-pale* and *strong-weak*) emerged on the general evaluative factor, one (*masculine-feminine*) turned up on the "seriousness" factor, and one (*placid-vigorous*) proved to be exceedingly complex, with significant or nearly significant loadings on all four of the interpretable factors.

5. *Humor*. This hypothesis was confirmed in the sense that both of the scales hypothesized for this factor appeared on a "seriousness" factor. This factor, however, proved to be of greater extent than originally believed.

6. *Personal Appeal*. This hypothesis was well confirmed, at least to the extent that two of the scales (*intimate-remote* and *impersonal-personal*) served to define a "personal appeal" factor in the ultimate analysis. It turned out, however, that the scale *natural-affected* was not properly placed under Personal Appeal, but belonged rather to Factor D, Ornamentation.

7. *Affective Tone*. This hypothesis was not confirmed. The two scales originally placed here turned out to be composite measures of both Factor B, Personal Appeal, and Factor D, Ornamentation.

The results of this study are also of interest in throwing light on certain concepts of style which psychologists have been attempting to define. One of these is the concept of abstractness, which has been postulated as a dimension which affects ease of comprehension and speed of learning. Our results show that this is actually a composite variable: our rating of abstractness has loadings on both the "seriousness" factor and the "ornamentation" factor. This means that a passage is rated as abstract in the degree to which it is also rated as both serious and florid. It is quite reasonable to suppose that seriousness and ornamentation ("wordiness") could independently influence such variables as ease of comprehension and speed of learning.

A Typology of Style

It should be possible to use the dimensions isolated in this study as a basis for "typing" literary styles, somewhat in the manner of Sheldon's "somatotyping" of bodily types. Where Sheldon uses three dimensions, we would use four. For convenience, we will use only selected subjective rating scales, one from each of the four chief factors we have identified, except that Factor A will be represented by two scales because of the possibility that the domain of evaluation has not been adequately delineated by the factor analysis at the present stage of computations. In the table below, we present the averaged subjective ratings on each of five scales for each of 8 passages from our "sub-sub-treasury."

Appendix B

Sample (300-word passage selected from:)	Average ratings (scale 1 to 7) (A) vivid	 (A) precise	 (B) personal	 (C) serious	 (D) florid
15 Blackwood, *Diary of a Nursing Sister on the Western Front*	6.9	6.2	6.1	6.7	2.8
21 K. Burke, *A Grammar of Motives*	2.2	1.6	2.0	6.3	4.7
48 A will (legal document)	2.3	4.2	2.7	6.5	4.4
49 Fitzgerald, *Diamond as* Big as *the Ritz*	6.4	5.5	4.6	4.3	6.2
62 Harris, *Uncle Remus*	6.4	5.2	5.6	1.9	4.8
131 Strachey, *Elizabeth and Essex*	5.7	5.7	3.7	6.2	4.8
129 Stein, *Paris, France*	5.4	4.3	5.8	5.3	2.9
139 Twain, *Huckleberry Finn*	7.0	6.5	6.5	4.8	4.3

While passages seem to be quite well and reasonably differentiated by the ratings, it can hardly be claimed that all the idiosyncrasies of style have been measured. The four dimensions of style we have identified do not sufficiently well discriminate, say, between the passage from Gertrude Stein and the passage from a nursing sister's diary, but nevertheless the main trends are evident.

In the present discussion we have attempted only to describe the more conspicuous relationships in our results. As has been indicated, some further statistical treatment of the data is called for. It would not be appropriate at this juncture to go very far in drawing from these results implications for pedagogy, criticism, communication theory, and such, for, as is so often the case, the investigation asks more questions than it answers.

Appendix C

A Bibliography of Speech and Personality Studies

John B. Carroll

1. Allport, G. W. and Vernon, P. E. *Studies in expressive movement*. New York: Macmillan, 1933.
2. Bell, John E. *Projective techniques*. *A dynamic approach to the study of the personality*. New York: Longmans, Green and Co., 1948. Chapter XXI, Voice and Speech.
3. Berg, Irwin A. Ideomotor response set: symbolic sexual gestures in the counseling interview. *J. counsel. Psychol*., 1954, 1, 180-183. PA 29:5656.
4. Black, J. W. A study of voice merit. *Quart. J. Speech*, 1942, 28, 67-74. PA 16:2750.
5. Cantril, H. and Allport, G. W. *The psychology of radio*. New York: Harper, 1935. Chapter VI, Voice and Personality; VII, Sex Differences in Radio Voices; VIII, Speaker vs. Loud-Speaker; IX, Listening vs. Reading.
6. Cofer, Charles N. and Dunn, James T. (U. Maryland, College Park.) Personality ratings as influenced by verbal stimuli. *J. Pers*., 1952, 21, 223-227. PA 27:7652.
7. Cowan, J Milton. Pitch and intensity characteristics of stage speech. *Archives of Speech*, Supplement, Dec. 1936, 92 p.
8. Cowan J M. and Bloch, Bernard. An experimental study of pause in English grammar. *American Speech*, 1948, April, 89-99.
9. Diehl, Charles F. The effect of voice quality on communicativeness. In Pennsylvania State College, Abstracts of doctoral dissertations...1949. State College, Pa., 1950, 12, 197-203. PA 25:1754.
10. Dow, C. W. The personality traits of effective public speakers. *Quart. J. Speech*, 1941, 27, 525-532. PA 16:1590.
11. Eisenberg, P. and Zalowitz, E. Judging expressive movement: III. Judgments of dominance-feeling from phonograph records of voice. *J. appl. Psychol*., 1938, 22, 620-631.
12. Fay, P. J. and Middleton, W. C. Judgment of occupation from the voice as transmitted over a public address system and over a radio. *J. appl. Psychol*., 1939, 23, 586-601. PA 14:983.
13. Fay, P. J. and Middleton, W. C. Judgment of Spranger personality types from the voice as transmitted over a public address system. *Character and Personality*, 1939, 8, 144-155. PA 14:1938.
14. Fay, P. J. and Middleton, W. C. Judgment of Kretschmerian body types from the voice as transmitted over a public address system. *J. soc. Psychol*., 1940, 12, 151-162. PA 15:182.
15. Fay, P. J. and Middleton, W. C. The ability to judge the rested or tired condition of a speaker from his voice as transmitted over a public address system. *J. appl. Psychol*., 1940, 24, 645-650.
16. Fay, P. J. and Middleton, W. C. The ability to judge sociability from voice as transmitted over a public address system. *J. soc. Psychol*., 1941, 13, 303-309.
17. Fay, P. J. and Middleton, W. C. The ability to judge truth-telling, or lying, from the voice as transmitted over a public address system. *J. gen. Psychol*., 1941, 24, 211-215.
18. Fay, P. J. and Middleton, W. C. Rating a speaker's natural voice when heard over a public address system. *Quart. J. Speech*, 1941, 27, 120-124.
19. Fay, P. J. and Middleton, W. C. Judgment of introversion from the transcribed voice. *Quart. J. Speech*, 1942, 28, 226-228. PA 16:2725.

20. Fields, Sidney J. Discrimination of facial expression and its relation to personal adjustment. J. soc. Psychol., 1953, 38, 63-71. PA 28:6024.

21. Frenkel-Brunswik, E. Mechanism of self-deception. J. soc. Psychol. (SPSSI Bull.), 1939, 10, 409-420.

22. Gage, N. L. (U. Illinois, Urbana) Judging interests from expressive behavior. Psychol. Monogr., 1952, 66(18), No. 350, 20 p. PA 27:7135.

23. Gardner, Riley W. Cognitive styles in categorizing behavior. J. Pers., 1953, 22, 214-233. PA 28:5641.

24. Gilkinson, Howard. Outlines of research in general speech. Minneapolis: Burgess, 1943, 354-item bibliography.

25. Gilkinson, H. and Knower, F. H. Analysis of a guidance questionnaire for students of speech. J. exp. Educ., 1940, 9, 175-176.

26. Gilkinson, H. and Knower, F. H. Individual differences among students of speech as revealed by psychological tests. Quart. J. Speech, 1940, 26, 243-255.

27. Gilkinson, H. and Knower, F. H. A study of standardized personality tests and skill in speech. J. educ. Psychol., 1941, 32, 161-175.

28. Golden, A. L. Personality traits of drama school students. Quart. J. Speech, 1940, 26, 564-575. PA 15:3045.

29. Goldman-Eisler, Frieda. The measurement of time sequences in conversational behavior. Brit. J. Psychol., 1951, 42, 355-362. PA 26:5548.

30. Goldman-Eisler, Frieda. On the variability of the speed of talking and its relation to the length of utterances in conversations. Brit. J. Psychol., 1954, 45, 94-107. PA 29:2375.

31. Goldman-Eisler, Frieda. Speech breathing activity--A measure of tension and affect during interviews. Brit. J. Psychol., 1955, 46, 53-63. PA 29:6757.

32. Grünewald, E. Über Sprache und Ausdruck in der Psychotherapie; ein Beitrag zur "Verhaltensanalyse." Wien. Z. prakt. Psychol., 1949, 1, 111-121. PA 26:945.

33. Grummon, Donald L. and Butler, John M. Another failure to replicate Keet's study, "Two verbal techniques in a miniature counseling situation." J. abnorm. soc. Psychol., 1953, 48, 597. PA 28:5981.

34. Gühlstorf, M. Neue Versuche über das persönliche Tempo. Z. Arbeitspsychol., 1939, 12, 151-159. PA 16:1885.

35. Hall, Robert A., Jr. Idiolect and linguistic super-ego. Studia Linguistica, 1951, 5, 21-27.

36. Hamilton, Robert V. Psycholinguistic analysis. J. soc. Psychol., 1955, 41, 271-286. PA 30:5936.

37. Henze, Reinhold. Experimentelle Untersuchungen zur Phänomenologie der Sprechgeschwindigkeit. Z. exp. angewand. Psychol., 1953, 1, 214-243. PA 28:7084.

38. Hildreth, Richard A. An experimental study of audiences' ability to distinguish between sincere and insincere speakers. Speech Monogr., 1954, 21, 146. - Abstract of Ph.D. thesis, U. Southern California, 1953.

39. Holland-Gems, P., Hall, A. M., and Pear, T. H. Judgments of the social class of different kinds of English speech. Quart. Bull. Brit. psychol. Soc., 1950, 1, 305-306. PA 27:5058.

40. Holsopple, James Q., and others. The Sentence Completion Test. Springfield, Illinois: Charles C Thomas Co., 1955.

41. Hunter, A. D. A comparison of introverted and extroverted high school speakers. Speech Monogr., 1935, 2, 50-53. PA 13:2761.

42. Jenkins, J. J. Research studies on the role of language in behavior. Mimeographed ms. 6-15, U. of Minnesota, 1953.

43. Jenkins, J. J. and Schaefer, Marjorie. Word association phenomena at the individual level: a pair of case studies. Dittoed ms. 31 pp, U. of Minnesota, 1955.

44. Jones, H. E. The adolescent growth study. VI. The analysis of voice records. *J. consult. Psychol*., 1942, 6, 255-256. PA 16:4876.

45. Keilhacker, M. Sprechweise und Persönlichkeit; eine experimentelle Untersuchung. *Z. angew. Psychol*., 1940, 59, 215-241. PA 16:1969.

46. Kelly, E. L. Personality as revealed by voice and conversation without face to face acquaintance. *Psychol. Bull*., 1938, 35, 710. (Abstract)

47. Kimoto, Blanche. A quantitative analysis of grammatical categories as a measure of dominance. Ph.D. thesis, Boston University, 1951. PA 26:1795.

48. Klein, George S. The Menninger Foundation research on perception and personality, 1947-1952: a review. *Bull. Menninger Clinic*, 1953, 17, 93-99. PA 28:557.

49. Knower, F. H. A study of speech attitudes and adjustments. *Speech Monogr*., 1938, 5, 130-203. PA 13:6365.

50. Lee, Dorothy. Freedom, spontaneity and limit in American linguistic usage. *Explorations*, 4, 6-14.

51. Lersch, Philipp. *Gesicht und Seele; Grundlinien einer mimischen Diagnostik*. Basel: Reinhardt, 1951. 167 p. -- This is a reissue of a book first published in 1932 (see PA 6:3884). PA 26:281.

52. Linke, Charles E. A study of pitch characteristics of female voices and their relationship to vocal effectiveness. *Speech Monogr*., 1954, 21, 149, Abstract of Ph.D. thesis, State U. Iowa, 1953. PA 29:2730.

53. Loewenberg, Richard D. Speech impulse and language frustration. *Etc. Rev. gen. Semant*., 1951, 8, 110-116. PA 26:7118.

54. Lorenz, Maria and Cobb, Stanley. Language behavior in psychoneurotic patients. *A.M.A. Archives of Neurology and Psychiatry*, 1953, 69, 684-694.

55. Lorenz, Maria and Cobb, Stanley. Language patterns in psychotic and psychoneurotic subjects. *A.M.A. Arch. Neurol. Psychiat*., 1954, 72, 665-673. PA 29:7459.

56. Lorge, I. and Thorndike, E. L. The value of the responses in a completion test as indications of personal traits. *J. appl. Psychol*., 1941, 25, 191-199.

57. Lorge, I. and Thorndike, E. L. The value of the responses in a free-association test as indicators of personal traits. *J. appl. Psychol*., 1941, 25, 200-201.

58. Luft, Joseph. Differences in prediction based on hearing versus reading verbatim clinical interviews. *J. consult. Psychol*., 1951, 15, 115-119. PA 26:6235.

59. Mahl, George F. Disturbances and silences in the patient's speech in psychotherapy. *J. abnorm. soc. Psychol*., 1956, 53, 1-15.

60. McCarthy, Dorothea. Factors that influence language growth: home influences. *Elementary English*, November 1952.

61. Miller, Richard Bateman. Personality correlates of dramatic aptitude. In Abstracts of dissertations, Stanford Univ., 1950-51, 1951, 26, 262-266. (*Stanford U. Bull*., 8th ser., No. 67.)--Abstract of Ph.D. dissertation, Stanford U., 1950. PA 27:4119.

62. Moore, G. E. Personality changes resulting from training in speech fundamentals. *Speech Monogr*., 1935, 2, 56-59. PA 13:2639.

63. Moses, P. J. Social adjustment and the voice. *Quart. J. Speech*, 1941, 27, 532-536. PA 16:4881.

64. Moses, P. J. The study of personality from records of the voice. *J. consult. Psychol*., 1942, 6, 257-261. PA 16:4880.

65. Murray, E. A study of factors contributing to the maldevelopment of the speech personality. *Speech Monogr.*, 1936, 3, 95.

66. Murray, E. *The speech personality*. Philadelphia: J. B. Lippincott Co., 1937.

67. Murray, E. Speech personality and social change. *J. higher Educ.*, 1941, 12, 185-190.

68. Newman, Stanley and Mather, Vera G. Analysis of spoken language of patients with affective disorders. *Am. J. Psychiatry.*, 1938, 94, 913-942.

69. Newman, S. S. Personal symbolism in language patterns. *Psychiatry*, 1939, 2, 177-184.

70. Newman, S. S. Behavior patterns in linguistic structure: a case study. Pp. 94-106 in Spier, L., et al. (Editor) *Language, culture, and personality*.

71. Newman, Stanley. Cultural and psychological features in English intonation. *Transactions of N. Y. Academy of Sciences*, 1944, 7, 45-54.

72. Noel, Doris Ione. A comparative study of the relationship between the quality of the child's language usage and the quality and types of language used in the home. *J. educ. Res.*, 1953, 47, 161-167. PA 28:6513.

73. Oseas, Leonard. A study of some language correlates of passivity in personality. *Dissertation Abstr.*, 1954, 14, 1812-1813. Abstract of Ph.D. thesis, 1954, Northwestern U. PA 29:8433.

74. Pear, T. H. *Voice and personality*. New York: Wiley and Sons, 1931.

75. Pfaff, Paul L. An experimental study of the communication of feeling without contextual material. *Speech Monogr.*, 1954, 21, 155.--Abstract of Ph.D. thesis, U. Southern California, 1953. PA 29:2384.

76. Pickford, R. W. Imagination and the nonsense syllable: a clinical approach. *Character and Pers.*, 1938, 7, 19-40. PA 13:373.

77. Pollack, I., Pickett, J. M., and Sumby, W. H. On the identification of speakers by voice. *J. acoust. Soc. Amer.*, 1954, 26, 403-406. PA 29:2385.

78. Rim, Y. Perseveration and fluency as measures of introversion-extraversion in abnormal subjects. *J. Pers.*, 1955, 23, 325-334. PA 30:2294.

79. Rogers, Cyril A. The structure of verbal fluency. *Brit. J. Psychol.*, 1953, 44, 368-380. PA 28:5658.

80. Rose, F. H. Training in speech and changes in personality. *Quart. J. Speech*, 1940, 26, 193-196.

81. Rotter, Julian B. and Rafferty, Janet E. Tests of personality: word techniques. B. Rotter Incomplete Sentences Blank. In Weider, A., *Contributions toward medical psychology*, (see 27:7781), 590-598. PA 27:7792.

82. Ruesch, Jurgen (U. California Sch. Med., San Francisco) The therapeutic process. IV. The therapeutic process from the point of view of communication theory. *Amer. J. Orthopsychiat.*, 1952, 22, 609-700. PA 27:5951.

83. Ruesch, Jurgen and Bateson, Gregory. *Communication: the social matrix of psychiatry*. New York: W. W. Norton and Co., 1951.

84. Sanford, F. H. Speech and personality. *Psychol. Bull.*, 1942, 39, 811-845.

85. Sanford, F. H. Speech and personality: a comparative case study. *Character and Pers.*, 1942, 10, 169-198.

86. Saslow, George, Matarazzo, Joseph D., Guze, Samuel B. The stability of interaction chronograph patterns in psychiatric interviews. Progress report USPHS M-735, May 25, 1955.

87. Schafer, Roy. Tests of personality: word techniques. A. Word Association Test. In Weider, A., Contributions toward medical psychology, (see 27:7781), 577-589. PA 27:7793.

88. Schatzman, Leonard and Strauss, Anselm. Social class and modes of communication. Amer. J. Sociol., 1955, 60, 329-338. PA 30:961.

89. Schwesinger, Gladys C. Slang as an indication of character. J. appl. Psychol., 1926, 10, 245-.

90. Smith, Frances E. An experimental study of word reactions and temperament. (Presented 1951 APA meetings).

91. Spilka, Bernard, Hanley, T. D., and Steer, M. D. Personality traits and speaking intelligibility. J. abnorm. soc. Psychol., 1953, 48, 593-595. PA 28:5684.

92. Stagner, R. Judgments of voice and personality. J. educ. Psychol., 1936, 27, 272-277.

93. Starkweather, John Amsden. Judgments of content-free speech as related to some aspects of personality. Dissertation abstracts, 1955, 15, 1907. PA 30:5777.

94. Straus, Erwin W. Der Seufzer: Einführung in eine Lehre vom Ausdruck. Jb. Psychol. Psychother., 1954, 2, 113-128. PA 29:2116.

95. Stromer, Walter F. Listening and personality. Education, 1955, 75, 322-326. PA 29:7891.

96. Taylor, H. S. Social agreement on personality traits as judged from speech. J. soc. Psychol., 1934, 5, 244-248.

97. Templin, M. A study of aggressiveness in normal and defective speaking college students. J. Speech Disorders, 1938, 3, 43-49.

98. Tracy, J. A. An investigation of personality traits of mature actors and mature public speakers. Master's thesis, Univ. of Denver, 1935.

99. Trussell, M. A. The diagnostic value of the verbal summator. J. abnorm. soc. Psychol., 1939, 34, 533-538. PA 14:937.

100. Wilson, R. C., Guilford, J. P. and Christensen, P. R. The measurement of individual differences in originality. Psychol. Bull., 1953, 50, 362-370. PA 28:5653.

101. Wolff, W. The expression of personality: experimental depth psychology. 1943.

102. Wolff, Werner. Symbols of expression. 16mm. motion picture film, 1952. PA 29:1904.

103. Wyatt, G. L. Voice disorders and personality conflicts. Ment. Hyg. N. Y., 1941, 25, 237-250. PA 16:1037.